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**VEGETATION RESOURCES
OF
VANCOUVER ISLAND
VOLUME 1. FOREST ZONATION**

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PREFACE

This report, Vegetation Resources of Vancouver Island, is another contribution to the vegetation inventory of British Columbia. Since 1966, within the context of the Canada Land Inventory, the Soils Branch of the Ministry of Agriculture and the Research Branch of the Ministry of Forests cooperated to include vegetation as a part of the base inventory. This inventory was formalized in 1971 as a component of the Soil Survey. The mapping and data collection of vegetation has been an ongoing program of the Vegetation Unit of the Terrestrial Studies Section, Surveys and Resource Mapping Branch, Ministry of Environment. Vegetation is classified and described within the biophysical system (Walmsley and van Barneveld 1976). Forest regions, sections, zones, and subzones are described and mapped (1:100 000). Vegetation types are classified, described, and linked to soil classes and other environmental variables.

This project is designed to provide a framework of vegetation for future work in developing interpretations for a wide variety of resource uses, including wildlife habitats, recreation, and land use planning.

Throughout this report the terminology of "biophysical forest zonation" classification has been used. This terminology has since been modified to "biophysical vegetation zonation" to reflect that the classification scheme applies to all terrestrial habitats of North America, including grasslands and tundra. The term "biophysical forest zonation" is therefore identical to the terminology of "biophysical vegetation zonation".



ABSTRACT

This report, Vegetation Resources of Vancouver Island, and the accompanying forest zonation maps are the product of the vegetation survey of the Vancouver Island mapsheets. Together, they provide basic information about the classification, distribution, and ecology of the vegetation and its related properties.

Fieldwork for the survey was carried out during 1973-1975. Data south of the 49°N latitude was collected under the supervision of Dr. E. Oswald of the Canadian Forestry Service, Victoria; data north of the 49°N latitude was collected by Terrestrial Studies Branch vegetation personnel.

The report is contained in three volumes. Volume 1 deals with descriptions of the regional vegetation, within the biophysical forest zonation classification. Two forest regions, four forest sections, eleven forest zones, and ten forest subzones, including both the environmental and ecological characteristics and major successional sequences found within each forest subzone are described. Volume 2 contains descriptions of the one hundred and six vegetation types classified for Vancouver Island, and includes a dendrogram showing hierarchical relationships between the types and a vegetation-soils table showing the relationships of vegetation types to soils association components described by Jungen (1982) and Chatterton and Senyk (1981).

The areal distribution of forest regions, zones, and subzones are shown on the forest zonation maps (1:100 000) contained in Volume 3.



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Editorial advice was provided by Jim van Barneveld, Ed Oswald, and Ted Lea. Special appreciation goes to Barbara Webb for her typing efforts.



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CHAPTER ONE INTRODUCTION

1.1 INTRODUCTION

The report on the vegetation resources of Vancouver Island is the product of a joint federal - provincial study carried out by the Canadian Forestry Service of Environment Canada and the Terrestrial Studies Branch (formerly Resource Analysis Branch) of the British Columbia Ministry of Environment. The data collection area was generally split along the 49th parallel of latitude with Dr. Oswald responsible for the southern portion and Mr. Harcombe responsible for the central and northern portion.

The vegetation study is part of an overall environmental study which was designed to inventory and map the climate (Coligado 1982b), terrain (Howes 1981; Jungen (in progress); Alley 1979), soils (Jungen 1981; Jungen (in progress); Chatterton and Senyk 1980), and vegetation of Vancouver Island.

1.2 OBJECTIVES

The objectives of the vegetation study of Vancouver Island are:

- a) to develop a classification of forest zonation and to map forest regions, zones, and subzones;
- b) to classify vegetation into detailed vegetation types;
- c) to determine the distribution of vegetation and its relationships to climate, terrain, soils, topography, nutrient cycling and moisture availability;
- d) to determine successional trends of the vegetation and their relationship to environmental factors;
- e) to provide data for interpretations for resource use and planning.

1.3 LOCATION OF THE STUDY AREA

The Vancouver Island study area covers all of Vancouver Island, including all west coast islands and four major east coast islands: Denman, Hornby, Malcolm, and Quadra (Figure 1). The study area includes portions of the National Topographic Series sheets 92B, 92C, 92E, 92F, 92G, 92K, 92L and 103I. The latitudinal range is from 48° 20'N, south of Victoria, to 50° 40'N, north of Cape Scott and a longitudinal range from 123° 10'W to 128° 30'W, with a land area in excess of 33 000 square kilometers.

1.4 METHODS

From 1973 through 1975, 885 vegetation plots were selected and described, each chosen to be representative of a site with homogenous vegetation and with uniformity in apparent soil and other physical characteristics. The data were recorded using several versions of data forms, with selected relevant data being later converted to fit the 1981 version of field ecosystem data forms (Walmsely *et al.* 1980). Climax and seral vegetation were sampled, with an attempt to include all major vegetation stages found on a wide range of soil materials. Plot dimensions were variable, with most approximating a tenth of a hectare. The level of soil data collection on each vegetation plot was sufficient for pedologists to assign each to a soil association component (Jungen 1981; Chatterton and Senyk 1980). The physical site data will not be presented in its raw form within this report - it will however become available from the site file of the vegetation data bank, presently in the process of development.

The vegetation data were analysed independently of the other environmental data, using classification analysis in a data analysis/handling program called COENOS II (Ceska 1975; British Columbia Systems Corporation 1980). Constraints in the program dictate that the species list, stratified by plant layer, be reduced to the most common two hundred species though others may be reintroduced after analysis. Groups of plots are initially defined using

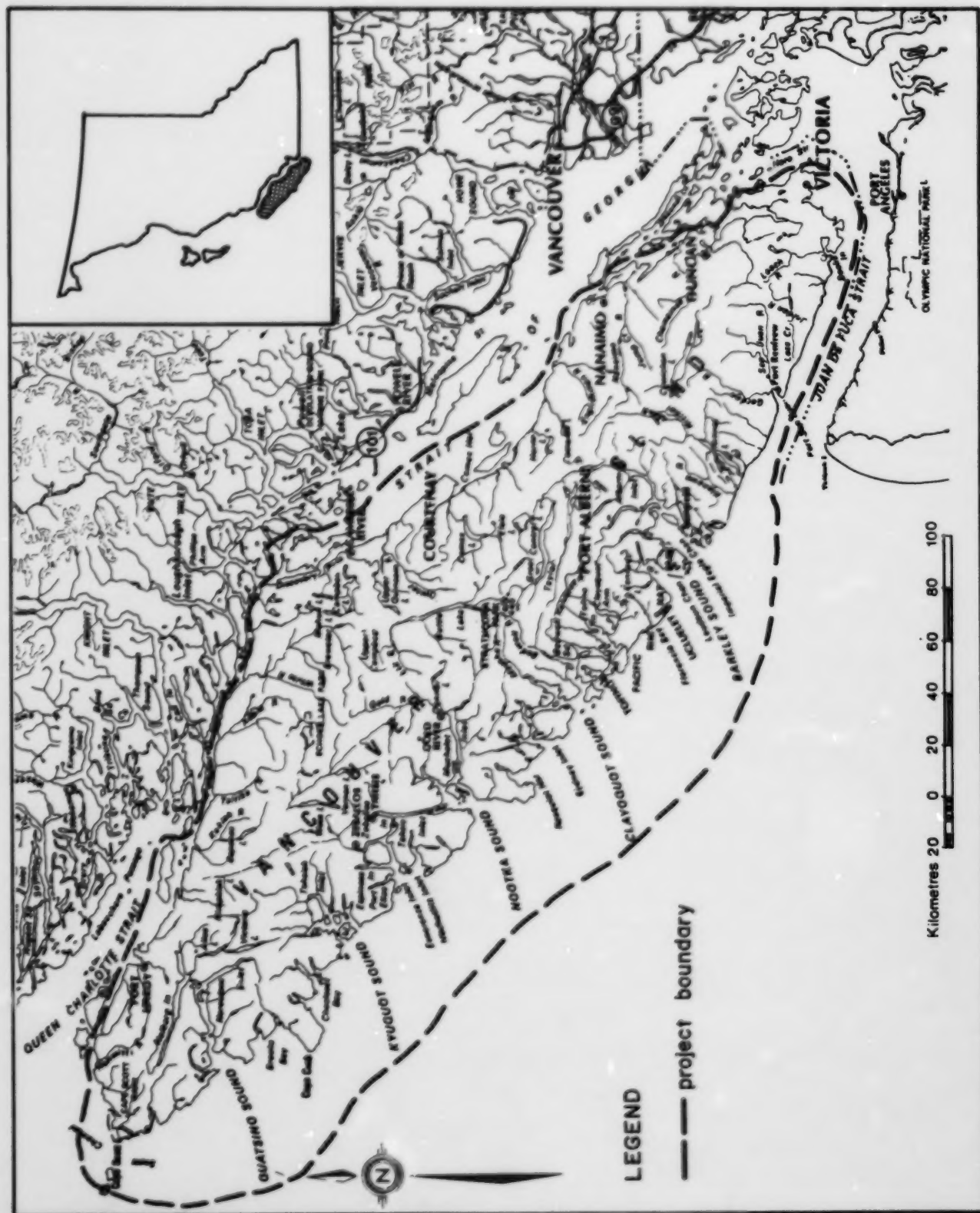


Figure 1. Location of the study area.

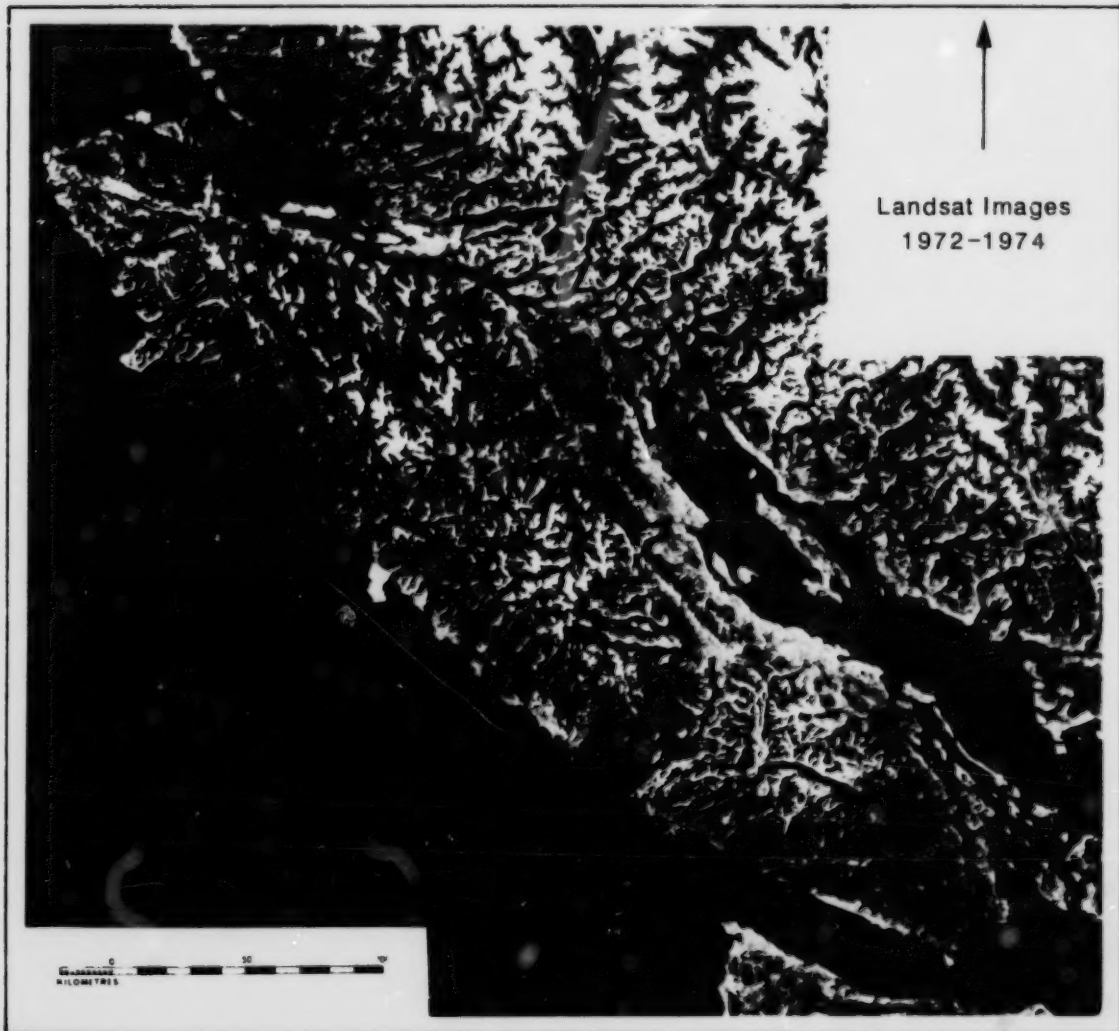


Figure 2. The diverse topography of the coastal physiographic units shown on a Landsat mosaic (courtesy EMR, Ottawa).

presence/absence data in a dissimilarity analysis (Arlidge and Kovats 1969). This creates a dichotomous hierarchical classification of plotgroups. Cluster analysis, using quantitative percent cover data, is then applied to reorder the plots within each plotgroup, to rearrange the order of plotgroups and to order the species within layers. In addition to the production of dendrograms, this data package also produces synthesis tables, showing cover values of each species in each plot ordered within plotgroups, and constancy tables, showing constancy values (frequency of occurrence) for each species in each plotgroup.

The final plotgroups were then analysed subjectively, using all available floristic and physical data and experience. Arbitrary stopping rules in the dissimilarity analysis sometimes produces plot groupings either broader or narrower in nature than desired. Some judgemental combining or splitting of plotgroups may occur. The final result is the definition of plotgroups as vegetation types, defined as units of vegetation, the members of which have a variable number of floristic characteristics in common with at least some of the other members of the same type (Harcombe 1978). These types have varying degrees of internal similarity, based on varying ecological amplitudes of species and on different sampling frequencies. One hundred and six final vegetation types were defined with the aid of these analyses - these types are described in Volume 2 of this report.

Information concerning the distribution of tree species and other dominant vegetation was collected for the area. This was applied to define biophysical forest zonation according to the system of classification developed by the Terrestrial Studies Branch (van Barneveld 1976). Three levels of biophysical zonation were mapped: forest regions, forest zones, and forest subzones. The working scale mapping was 1:50 000, with final map production at a scale of 1:100 000; these maps can be found in Volume 3 of this report.

CHAPTER TWO DESCRIPTION OF THE STUDY AREA

2.1 INTRODUCTION

Climate, terrain, and soils are an integral part of a vegetation survey. The biophysical reconnaissance inventory of Vancouver Island has included inputs from these three other disciplines, all closely interrelated with the vegetation. Because much of the information is still in draft form and not readily available, the following two sections will briefly describe the regional climate and terrain/soils of the study area, emphasizing information that is of importance to broad vegetation patterns. More specific references to relevant biophysical resources will be made in Chapter 3. The references include sources of more detailed information that may be desired.

2.2 REGIONAL CLIMATE

The climate of Vancouver Island is dominated by the onshore flow of air masses traversing the Pacific Ocean. The high mountains confront these moist westerly winds from a great unfrozen ocean (Hare and Thomas 1979). The combination of high precipitation, year-round moderate temperatures, with mild winters results in a potential for high vegetative productivity within the study area. Hare and Thomas (1979) describe three variants of the Pacific coast climate that have important implications on plant species distributions.

West-facing mountain slopes confront the westerly flow along the west coast - these slopes are usually cloud covered and wet because of the orographic uplift of moist air, particularly in late fall, winter, and early spring. Prolonged and sometimes heavy rain falls whenever a Pacific cyclone approaches.

The eastern faces of the mountains and the narrow strips of land along Georgia Strait have a much less rainy climate. Being on the leeward side, the

air masses descend and warm up by compression resulting in cloud dissipation. These areas tend to have prolonged sunny, dry weather, especially during the summer.

The third variant of the coast climate is in the southeastern portion, in the Saanich Peninsula and Malahat areas. This region is in the rainshadow of the Olympic Mountains in Washington State. Precipitation is almost totally confined to the cooler season and abundant solar energy is received in the summer.

There are two characteristic climatic periods of the year. From early October to the spring, Pacific westerlies are almost continuous, with cyclonic storms bringing cloud, rain, and snow. Occasionally, high pressure systems break this flow, and cold Arctic air may spill westward to the Pacific, bringing bright, cold weather (Hare and Thomas 1979). In the spring, the westerlies weaken, temperatures rise, and rain becomes less frequent. During the summer months, a high pressure area dominates the weather along the coast of British Columbia. This brings long hours of sunshine to the region. Temperatures at this time range from 15-25°C near the sea and between 25 and 35°C inland.

Saanich Peninsula (including Victoria) is the driest spot on the Island. In late summer, a major portion of the island, particularly the eastern and southwestern sections, suffers from moisture deficiency. Climatic moisture deficits (precipitation minus potential evapotranspiration) amount to as much as 150 to 200 mm from May to September (Coligado 1982b).

Extensive areas, particularly those with westerly exposures along the coast and at high elevations, receive in excess of 2500 mm of precipitation (Schaefer 1978). Snowfall accounts for only a small fraction of total annual precipitation near sea level, though snow becomes more prevalent at higher elevations. The drier southeastern area of Vancouver Island may receive less than 900 mm of precipitation. Cooler climates are encountered at higher elevations, since temperatures decrease at a rate of about 5°C for every 1000 m

increase in elevation (Schaefer 1978). Summer is shorter and cooler, and most winters have deep snow packs. Tuller (1979) lists the mean April 1 snow depths at higher elevations as between 350 and 450 cm.

The moderating effect of the ocean on dampening temperature fluctuations is especially noticable along the west coast, though this effect slowly dissipates towards inland, with maximum temperatures becoming higher and nights becoming cooler. Temperature generally decreases with increase in elevation - however, cold air pooling can occur in valley bottoms or low hollows when the natural outflow of air on clear cold nights is retarded or prevented (Coligado 1982a).

Solar radiation is of prime importance to vegetative productivity. Total solar radiation and hours of bright sunshine decrease from the southeast of the Island to the northwest. The northwestern area (ie. Port Hardy) has the least sunshine hours and solar radiation on the Island. Vancouver Island, as a whole, has a relatively favourable net radiation climate throughout the year, since the winter cloudiness and limited snow cover prevents surface cooling by restricting the escape of long wave radiation and by reducing surface albedo (Tuller 1979). Thus, deep freezing within the soil is not common.

The freeze-free period (FFP) is relatively long and somewhat compensates for lack of summer heat. Averages range from about 250 days near the coast to about 150 days inland (Coligado 1982b). The west and southeast coast, have the longest freeze-free periods in Canada (Tuller 1979). Freeze-free periods become shorter by approximately 8 days per 100 meters in elevation in non-frost pocket areas above the "thermal belt" of valleys (Coligado 1982a). Effective growing degree days (EGDD)¹ above 5°C also decreases with elevation except where frost pockets are occurring. On Vancouver Island, it has been found that EGDD decrease by 35 EGDD per 100 meters on north-sloping surfaces and by 40 EGDD per 100 meters on south-sloping surfaces (Coligado 1982a). The thermal

¹Air Studies Branch, 1981.

units as measured by the effective growing degree days (EGDD) above 5°C on the Island varies from 600 to slightly more than 1100 on the low lying areas. The west coast is characterized by values of between 700 and 800 while the interior areas have 800 to 1000. The eastern side has the highest EGDD values ranging from 900 to 1100 while the northeast tip has some areas characterized by values ranging from 600 to 700 (Coligado 1982a).

2.3 TERRAIN AND SOIL

Vancouver Island is within the Western System of major physiographic subdivisions and includes parts of both the Outer Mountain Area and the Coastal Trough (Holland 1976). In the Insular Mountains, summits are highest in the central part of Vancouver Island (2000 m), and the mountain topography is extremely rugged (Figure 2). Remnants of the Tertiary erosion surface occur as level or gently sloping ridge crests along the Coastal Trough; the surface lies below 600 m elevation but rises gradually westward towards the mountains. Erosion surface remnants and landforms of mountain glaciation (both alpine and overridden types) constitute much of the Vancouver Island landscape (Ryder 1978).

The terrain is underlain mainly with folded and faulted volcanic rocks intrusive igneous rocks, limestone, and flat or gently dipping sedimentary rocks. The residue from prolonged physical and chemical weathering provides a coarse textured, acid parent material (Jungen and Lewis 1978).

Glaciation is the major source of surficial materials for soil formation on Vancouver Island. Coastal areas were depressed by the weight of the ice melt, these areas later rebounded, leaving a complex marine-influenced zone along much of the coast. Glaciation also resulted in typically rounded ridges and summits of all but the highest mountains, and in the widespread morainal deposits found in lower parts of the valleys.

Within the mountains, thick morainal deposits are found only on the valley floors and adjacent hillsides. Floodplains, with flanking river terraces,

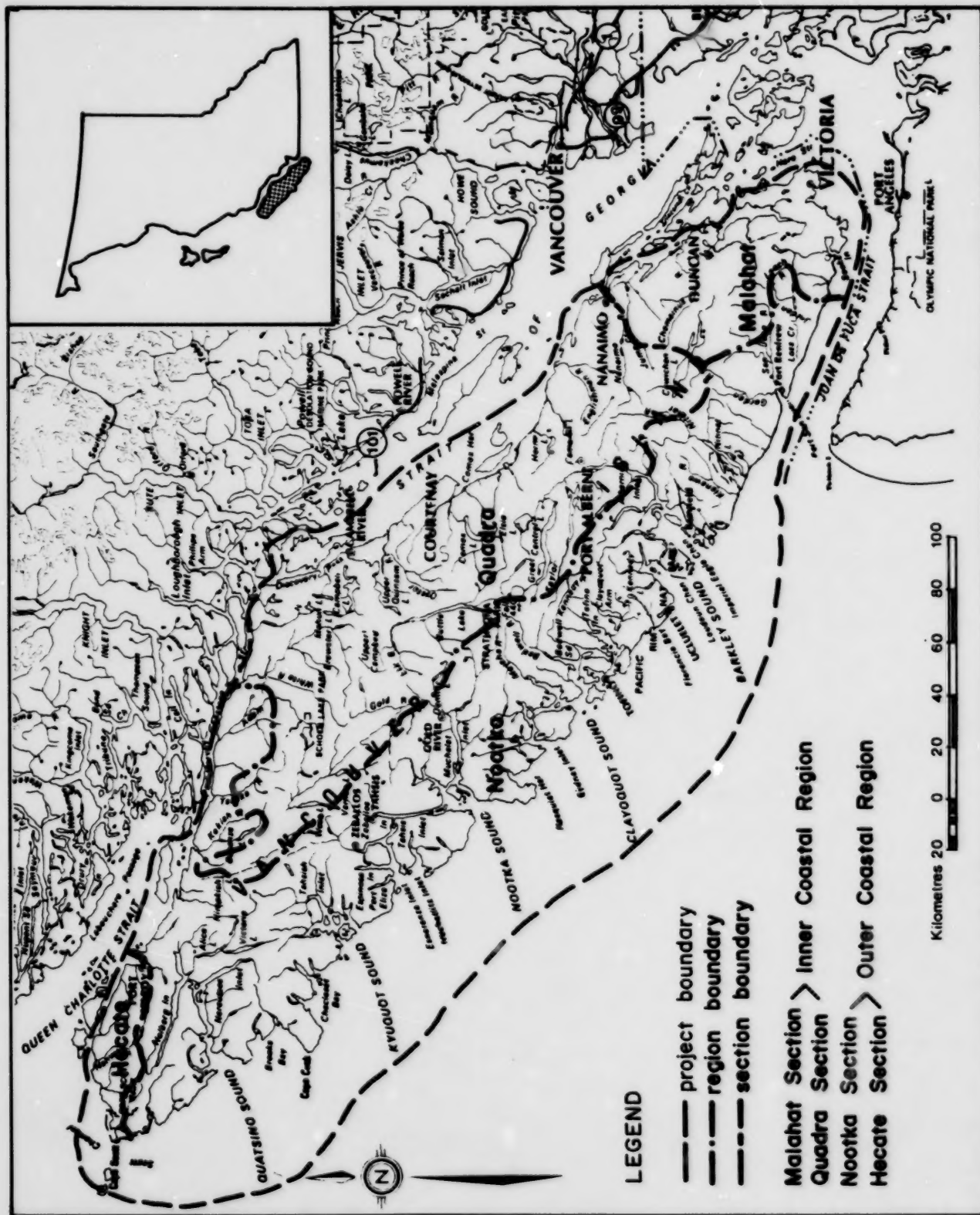


Figure 3. Forest regions and sections of Vancouver Island.

often occupy the central part of the valley floor. On most slopes there are extensive bedrock outcrops and accumulations of rubbly colluvium. Relatively gentle mountain slopes usually have a thin till mantle (Ryder 1978). The rugged steep terrain results in unstable areas where soil development is hindered by slope creep of surficial materials; this steep topography has considerable influence on this development through colluviation, erosion, talus slopes, and general soil disturbances (Jungen and Lewis 1978). Other soil disturbance is caused by windthrow of large trees which mixes upper soil horizons.

Within the lowlands of the Coastal Trough, summit levels are generally below 600 m. Morainal deposits are thickest and most continuous here, though there are some areas of abraded rock surfaces and resistant rock outcrops. Fluvioglacial gravels form extensive hilly and undulating areas in the lowlands. Fluvial gravels and sands occur as terraces and floodplains along major rivers that cross the coastal lowlands (Ryder 1978).

The main distinguishing features of coastal-area soils are the "prevalence of deep reddish to yellowish brown B horizons rich in iron and aluminum oxides, the thick surface organic horizons derived from forest litter, and the development of extremely compact cemented horizons or pans in the B and C horizons" (Jungen and Lewis 1978).

CHAPTER THREE REGIONAL VEGETATION

3.1 GENERAL VEGETATION

The vegetation¹ of Vancouver Island is dominated by dense forests, which have a dominance of evergreen species over deciduous species. Patterns of vegetation are first controlled on a broad scale by macroclimatic processes and on a finer scale by mesoclimate, soil material, topographical position, nutrient and moisture regimes, and other more site - specific factors. Native conifers have the ability, because of the presence of relatively dry, cool summers and warm, wet winters on Vancouver Island, to carry on photosynthesis outside of the accepted agricultural growing season (May to September). They also have the ability to attain large size, live for a long time (some greater than 1000 years), and produce a massive amount of organic matter. There are also advantages to the coniferous habitat in meeting nutritional needs by lessened annual requirements for mineral uptake and in dealing with moisture stress during dry summers (Franklin 1979). Hardwood species tend to grow on lower quality or disturbed sites (e.g. Garry oak on rock outcrops; red alder on fresh parent material). Thirteen coniferous tree species and six broadleaf tree species contribute significantly to the vegetation patterns, though other species are also present. These species with their names and symbols, are listed in Table 1.

A number of different approaches have been used to describe and classify patterns of ecologically important entities in the Pacific Northwest (Krajina 1969; Packee 1974; Klinka et al. 1979; Orloci 1964; Franklin and Dyrness 1973; Daubenmire and Daubenmire 1968; Harcombe 1978; Lea 1984). Each approach has its strengths and weaknesses and particular emphasis on certain

¹Common names are used throughout this report. Their botanical names are listed in Appendix B in Volume 2 - all nomenclature is after Taylor and MacBryde (1977).

Table 1
Common tree species of Vancouver Island

<u>Common Name</u>	<u>Map Symbol</u>	<u>Botanical Name</u>
alpine fir	aIf	<i>Abies lasiocarpa</i> (W. J. Hooker) Nuttall
bigleaf maple	bM	<i>Acer macrophyllum</i> Pursh
black cottonwood	bCo	<i>Populus balsamifera</i> Linnaeus subsp <i>trichocarpa</i> (Torrey & Gray ex W. J. Hooker) Brayshaw
coast Douglas-fir	D	<i>Pseudotsuga menziesii</i> (Mirbel) Franco var. <i>menziesii</i>
Garry oak	gO	<i>Quercus garryana</i> D. Douglas ex W. J. Hooker
grand fir	gF	<i>Abies grandis</i> (Douglas ex D. Don) Lindley
lodgepole pine	lP	<i>Pinus contorta</i> D. Douglas ex Loudon var. <i>latifolia</i> Engelmann in S. Watson
mountain hemlock	mH	<i>Tsuga mertensiana</i> (Bongard) Carriere
Pacific madrone	Ar	<i>Arbutus menziesii</i> Pursh
Pacific silver fir	aF	<i>Abies amabilis</i> (D. Douglas ex Loudon) J. Forbes
red alder	rAl	<i>Alnus rubra</i> Bongard
shore pine	sP	<i>Pinus contorta</i> D. Douglas ex Loudon var. <i>contorta</i>
Sitka spruce	sS	<i>Picea sitchensis</i> (Bongard) Carriere
western flowering dogwood	wDo	<i>Cornus nuttallii</i> Audubon ex Torrey & Gray
western hemlock	wH	<i>Tsuga heterophylla</i> (Rafinesque) Sargent
western red cedar	wC	<i>Thuja plicata</i> Donn ex D. Don in Lambert
western white pine	wwP	<i>Pinus monticola</i> D. Douglas ex D. Don in Lambert
western yew	Y	<i>Taxus brevifolia</i> Nuttall
yellow cedar	yC	<i>Chamaecyparis nootkatensis</i> (D. Don) Spach

floristic or physical factors. However, only one classification will be utilized for the following discussion on regional vegetation on Vancouver Island: the biophysical forest classification developed within the Ministry of Environment.

The biophysical classification is oriented towards a mapping approach, using ecologically significant units defined on the basis of both biological and physical parameters. Ecological significance refers to the "energy flow, and the mechanisms and sequences by which the energy flow may take place" (Walmsley and van Barneveld 1977). Since energy processes are difficult to see and measure, the classification is based on morphological characters that are presumed to be indicators of these processes. Within the vegetation classification, the system is hierarchical. Each level of the classification uses as many parameters as possible for definition of units, though parameters may differ in importance at different levels. The system puts a lot of emphasis on ecological roles of major plant species and predictions as to their roles in succession; this can be considered a form of modeling, using both autecological and synecological knowledge to arrive at conclusions.

Five levels of vegetation classification are described in the following chapter: forest regions, forest sections, forest zones, forest subzones, and vegetation landscapes. The five interrelated levels are briefly defined here. A forest region is an area in which the broad regional climate (macroclimate) and physiography determine a definitive pattern of vegetation. Typically, the region is characterized by a key combination of climax plant species in the dominant plant layer, usually trees, though several other such combinations may also occur. In a given forest region, the vegetation resources and environmental limitations, such as the severity of winters, precipitation patterns, snow-melt and runoff characteristics, fire hazards, rate of vegetative change, pattern of soils and terrain, and many other natural conditions, broadly determine the social structures and economic opportunities and constraints for the area (Lea 1982).

A forest section is a subdivision of a region. It is distinguished on the basis of variations in the vertical sequence of climax vegetation, in dominant seral species, or in vegetation of edaphic inclusions, in each case where such variations are a reflection of differences in the macroclimate of the region (Walmsley and van Barneveld 1977). Sections may indicate areas of different potential wildlife habitats due to vegetation diversity, areas of different tree growth and forest stand structure, areas with different agricultural potential and areas with different snow depths or wildfire hazards (Lea 1984).

A forest zone is an area within a forest region or section on which the dominant vegetation of climax stands on similar soils and terrain is relatively similar. It is characterized by a key combination of climax plant species, usually trees, that are shade tolerant and become dominant through time in the absence of disturbances on sites that best reflect the climatic capability for the area. These sites are considered to have average or intermediate moisture and nutrient regimes, being more strongly influenced by regional climate than by extremes in soil material or site characteristics. Forest zones reflect differences that are significant for wildlife habitats, constraints for logging plans and site preparation, selection of species for planting, road building, agricultural potential, and other land uses (Lea 1982).

A forest subzone is an area within a forest zone defined on the basis of climate-related successional trends or growth form of the dominant vegetation. Climatic climax stands are expected to have the same combination of dominant species as in the appropriate forest zone, though the characteristic combination of species associated with sites that have been disturbed may change among subzones. Forest subzones reflect differences that are significant for forage characteristics of wildlife habitats, specific climatic parameters that are important for tree capability, forage or agricultural crops, selection of plant species for reforestation or revegetation, and many other land uses (Lea 1984).

A vegetation landscape is a distinct part of the landscape that displays a consistent combination of climate, soils, vegetation, and disturbance history.

Forest regions and sections are shown in Figure 3. The elevational ranges of forest regions, sections, zones, and subzones for Vancouver Island are summarized in Table 2, major climatic parameters are summarized in Table 3, and their broad vegetation patterns are depicted in Figures 4 and 5. Detailed

Table 2
Elevational ranges of forest zonation units

Biophysical Forest Units	Elevational Range (metres)
Inner Coastal Region	0-2040
Coastal grand fir - western red cedar zone	0- 300
Coastal western hemlock zone	0-1000
Coast Douglas-fir subzone	0- 500
Western hemlock subzone	0-1000
Coastal western hemlock - Pacific silver fir zone	700-1100
Yellow cedar subzone	700-1100
Subalpine mountain hemlock - Pacific silver fir zone	1000-1800
Forested subzone	1000-1500
Parkland subzone	1400-1800
Alpine tundra zone	1800-2040
Outer Coastal Region	0-2200
Coastal western hemlock - Pacific silver fir zone	0-1100
Western red cedar subzone	0- 600
Yellow cedar subzone	550-1100
Coastal western hemlock - western red cedar zone	0- 640
Subalpine mountain hemlock - Pacific silver fir zone	950-1800
Forested subzone	950-1400
Parkland subzone	1350-1800
Alpine tundra zone	1800-2200

Table 3
Selected climatic parameters for forest units

Biophysical Forest Units	Climatic Parameters ^{1,2}			
	May to Sept. Precipitation	Climatic Moisture Deficit/Surplus	Effective Growing Degree Days	Freeze Free Period
Inner Coastal Region	125 to 450 mm	-250 to +150 mm	400 to 1000 ⁺ °C days	100 to 200 days
Coastal grand fir - western red cedar zone	125 to 200 mm	-200 to -150 mm	750 to 1000 ⁺ °C days	160 to 200 days
Coastal western hemlock zone	125 to 300 mm	-250 to +50 mm	700 to 900 °C days	160 to 200 days
Coast Douglas-fir subzone	175 to 250 mm	-250 to -150 mm	700 to 950 °C days	160 to 200 days
Western hemlock subzone	125 to 300 mm	-200 to +50 mm	700 to 900 °C days	160 to 200 days
Coastal western hemlock - Pacific silver fir zone	300 to 450 mm	-50 to +100 mm	600 to 800 °C days	125 to 175 days
Yellow cedar subzone	300 to 450 mm	-50 to +100 mm	600 to 800 °C days	125 to 175 days
Subalpine mountain hemlock - Pacific silver fir zone*				
Forested subzone*	300 to 400 mm	75 to 150 mm	400 to 700 °C days	100 to 150 days
Parkland subzone*				
Alpine tundra zone*				
Outer Coastal Region	350 to 950 mm	50 to 400 ⁺ mm	300 to 800 °C days	125 to 280 days
Coastal western hemlock - Pacific silver fir zone	350 to 950 mm	100 to 400 ⁺ mm	400 to 800 °C days	150 to 280 days
Western red cedar subzone	350 to 800 mm	100 to 350 ⁺ mm	500 to 800 °C days	200 to 280 days
Yellow cedar subzone	500 to 950 mm	300 to 400 ⁺ mm	400 to 600 °C days	150 to 200 days
Coastal western hemlock - western red cedar zone	450 to 600 mm	100 to 150 ⁺ mm	500 to 600 °C days	250 to 200 days
Subalpine mountain hemlock - Pacific silver fir zone*				
Forested subzone*	350 to 400+ mm	50 to 300 mm	300 to 600 °C days	125 to 150 days
Parkland subzone*				
Alpine tundra zone*				

¹Parameters derived where possible from climatic parameter maps (Coligado 1982b).
²Parameters may be grouped for higher elevation complex forest zonation units(*).

descriptions of these biophysical units, as well as descriptions of major succesional trends within the subzones, are found in Sections 3.2 and 3.3. Forest zonation maps at a scale of 1:100 000 delineating forest regions, zones, and subzones, were produced for the entire study area (see Volume 3).

3.2 OUTER COASTAL REGION

Most of the western and northern areas of Vancouver Island are within the Outer Coastal Region (Figure 3). This forest region, within the wettest variant of the Pacific Coast climate, is characterized by two macroclimatic processes: onshore processes and orthographic lifting (Marsh 1983). The Pacific Ocean is the major climatic influence for most of the year; it moderates temperature fluctuations and produces a ready source of water vapour for the onshore westerly dominated storm systems. This moisture is deposited as precipitation in the Outer Coastal Region as air is forced up the west-facing slopes of Vancouver Island mountains. Frequent cloudiness and cooler summer temperatures produce substantial growing season precipitation, as well as low radiation and subsequent lower evapotranspiration. This results in large climatic moisture surpluses.

The soils are wet to moist for most of the year and rarely freeze to any depth. Excess moisture and a high incidence of associated poorly drained soils typify the lower portion of this forest region. The upper portion is cooler and receives more total precipitation, much of it as snow. The soils rarely freeze because of the insulating effect of the deep snow. Jungen and Lewis (1978) describe two major soil landscapes for the Outer Coastal Region: ferro-humic podzol and folisol soil landscapes. In the ferro-humic podzol soil landscape, the main soil processes are the accumulation of complexes of organic matter, iron and aluminum that produces soils with exceptionally strong podzolic B horizons. The soils have strong indications of turbic activity (caused by windthrown trees), are medium to coarse textured and generally lack horizons with clay accumulation. Leaching is intense, so soils are very acidic and nutrient availability is low in the mineral portion.

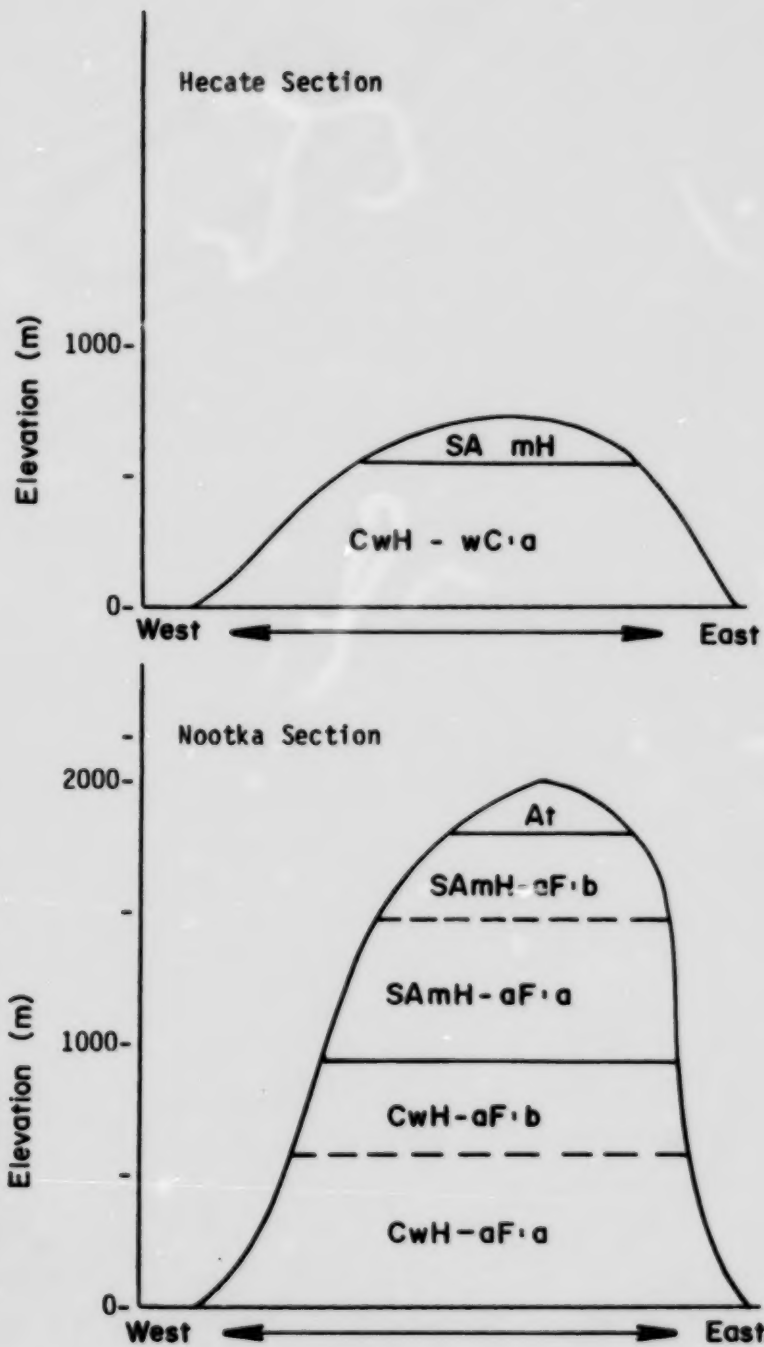


Figure 4. Forest sections, zones, and subzones of the Outer Coastal Region (see Table 4 for explanation of zonal and subzonal symbols).

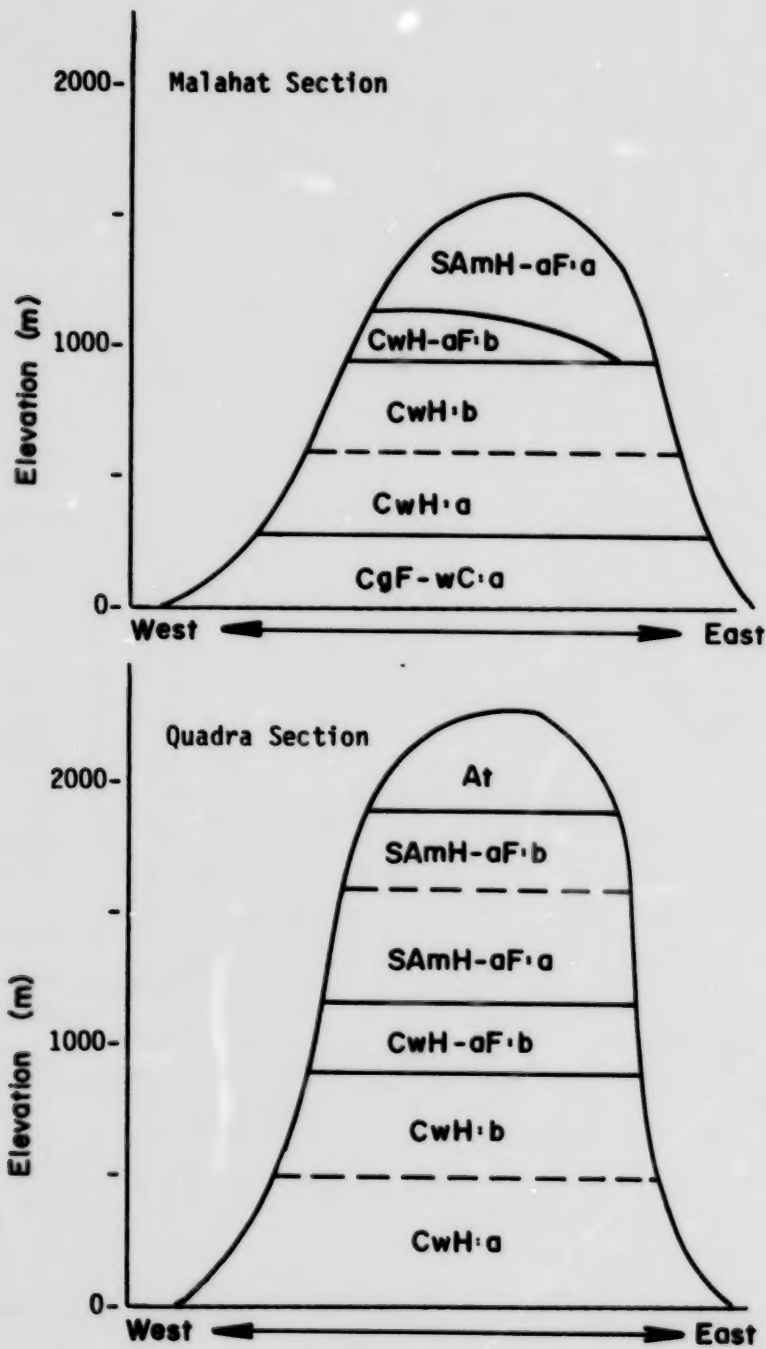


Figure 5. Forest sections, zones, and subzones of the Inner Coastal Region (see Table 4 for explanation of zonal and subzonal symbols).

Table 4
Zonal and subzonal symbols used in Figures 4 and 5

Symbol	Forest Zone and Subzone
At	Alpine tundra zone
CgF-wC:a	Coastal grand fir - western red cedar zone: Pacific madrone subzone
CwH:a	Coastal western hemlock zone: coast Douglas-fir subzone
CwH:b	Coastal western hemlock zone: western hemlock subzone
CwH-aF:a	Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
CwH-aF:b	Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone
CwH-wC:a	Coastal western hemlock - western red cedar zone: shore pine subzone
SAmH	Subalpine mountain hemlock zone
SAmH-aF:a	Subalpine mountain hemlock - Pacific silver fir zone: forested subzone
SAmH-aF:b	Subalpine mountain hemlock - Pacific silver fir zone: parkland subzone

However, a high production of organic material in the form of leaves, twigs, roots, and branches from the dense coniferous forests provides the major source of nutrients for vegetative productivity. Because much of the year is cool and wet, accumulation usually exceeds decomposition on the forest floor; these L, F, and H horizons become very deep in the absence of disturbance. This process of organic accumulation also occurs over bedrock on sites that are not continuously saturated with water, to form folisols. These folisols usually occur as minor associates with the ferro-humic podzol soil landscape, being most widespread at high elevations and on the windward outer coast (Jungen and Lewis 1978).

The major tree species at low elevations in the Outer Coastal Region are western hemlock, Pacific silver fir, western red cedar, and/or Sitka spruce. With increasing elevation, Pacific silver fir becomes more dominant, western

red cedar is replaced by yellow cedar, and western hemlock is replaced by mountain hemlock. Sitka spruce is locally abundant along the coastal fringe, because of its ability to withstand high salt levels on its foliage (unlike western hemlock); it is also common on lower floodplains. Western hemlock is probably dominant at low elevations because of a number of factors: the presence of non-freezing soils, an ability to extract nutrients from and regenerate on fallen logs and deep forest floor litter, a high shade tolerance, a wide ecological tolerance to soil moisture, a high seed production, and an ability for aggressive invasion of disturbed sites. It is intolerant of major soil moisture deficits. Pacific silver fir is a codominant at lower elevations on deep moderately well to well drained soils without high watertables. Increasing dominance over western hemlock with an increase in elevation is thought to be associated with its ability to regenerate in deeper snow areas better than western hemlock. Thornburgh (1969) found that a large amount of snow prevented western hemlock from successfully reproducing on the humus layer of the forest floor because snow flattens the weak drooping stem. Pacific silver fir requires soils that are very moist, whether this moisture is in the form of rain or slow melting of snow in the spring (Krajina 1969). It also requires unfrozen ground so that it receives a continuous moisture supply in winter. Krajina (1969) also lists Pacific silver fir as favouring rich sites and as having the highest shade tolerance among Canadian conifers.

Above about 1000 meters, mountain hemlock becomes the major dominant with Pacific silver fir. The upper elevational limit of western hemlock reproduction is apparently limited by failure of its seeds to germinate because of a combination of low temperature and a delay in the melting of snow (Thornburgh 1969). Mountain hemlock forms the dominant species on high elevation sites that are shallow and drier, such as sites frequently found at the upper limits of forested cover. It is a common tree invader of open heath areas and an early pioneer on high elevation moraines (Brook *et al.* 1970). As with western hemlock, the nutritional requirements of mountain hemlock are thought to be low; an adaptation that allows them to grow on deep forest floor litter with its slow but continual release of nutrients (Krajina 1969).

Western red cedar is a frequent component of low elevation climatic climax forests; its probable role is as a long-lived seral species, since regeneration under a dense western hemlock - Pacific silver fir canopy is rare. This may be due in part to a more demanding nutrient requirement. However, western red cedar grows more commonly on either wetter sites with excessive seepage or on shallower sites where it forms a scrubby climax with western hemlock. On both these sites, nutrient supplies may not be as limited.

Yellow cedar is considered to be both an edaphic climax and a seral species at elevations above about 600 meters. Like western red cedar, it is very long-lived and is often a seral component of western or mountain hemlock and Pacific silver fir forests, usually where seepage or excessive moisture is present. At these higher elevations, precipitation is often in the form of snow, slowly melting during late spring and early summer, maintaining available soil moisture for much of the growing season even on drier sites. It can also tolerate considerable frost on its foliage providing the unfrozen ground is well protected by a thick layer of snow (Krajina 1969). In wetland areas, yellow cedar may be found at lower elevations as a stunted member of the forest canopy.

On the subdued topography of the Nahwitti Plateau (Holland 1976; Howes 1981), dominant soil processes are more strongly influenced by high humidity, frequent cloudiness, and cool temperatures than by orographic lift. This results in excessive soil moisture and very slow organic decomposition, so folisols and organic soils are dominant. Pacific silver fir is rarely found in this environment; forests tend to be scrubby, dominated by western hemlock and western red cedar, often associated with shore pine and yellow cedar in wetter areas. Open organic communities are common.

3.2.1 Nootka Section

The Nootka Section is the most widespread forest section within the Outer Coastal Region. It includes all west and northeast coastal areas but the

northern end of Vancouver Island (Figure 3). Macroclimate processes are dominated by onshore processes and orographic lift (Marsh 1983). This section is characterized by a low elevation climatic climax of western hemlock and Pacific silver fir and by the presence of a distinct subalpine forested climatic climax of mountain hemlock and Pacific silver fir. This forest section is too wet for coast Douglas-fir except on edaphically dry sites. Climatic climax tree species are aggressive pioneers on sites where soil material disturbance is not too severe. Disturbed sites invariably regenerate to their original forested states except where soil removal from bedrock has taken place and forest capability is lost.

3.2.1.1 Coastal western hemlock - Pacific silver fir zone

The Coastal western hemlock - Pacific silver fir zone (CwH-aF) is the characteristic zone of the Nootka Section of the Outer Coastal Region. It ranges in elevation from sea level to about 1100 meters, and is found along the west coast from Jordan River to San Josef Bay and along the northeast coast from Kelsey Bay to Port Hardy. Physiographic subunits include parts of the Nahwitti Plateau, the Suquash Basin, the Estevan Coastal Plain, Fiord-land, and the Vancouver Island Range (see Holland 1976). The major macroclimatic feature influencing the low elevations in this zone is the onshore processes, with orographic lifting processes rapidly becoming important above about 600 meters and throughout the Vancouver Island Range subunits. This orographic lifting hastens condensation of the moisture in the air, resulting in the increase of precipitation along the mountain slopes. Coligado (1982a) suggests that annual precipitation may increase up to 20 per cent per 100 meters, up to an elevation of about 1200 - 1400 meters where the precipitation level probably begins to drop. Growing season precipitation invariably exceeds potential evapotranspiration; therefore, sites with the capability of conserving this moisture will not have vegetation growth limited by lack of soil water. Slopes with a southerly aspect will have a significant increase in potential evapotranspiration, especially when surfaces are wet (Coligado 1982a). Therefore, these sites will often be edaphically drier and this might be reflected in the vegetation.

Based on very general data (Coligado 1982a; Stordeur 1981), average February to May snowdepths probably exceed 1 meter above about 600 meters and exceed 1.5 meters above 1100 meters. The average freezing level during the coldest part of the winter is about 1000 meters, with the average maximum snowpack occurring in January (Coligado 1982a).

The Coastal western hemlock - Pacific silver fir zone is characterized by a climatic climax forest of western hemlock and Pacific silver fir on deep, moderately well to well drained sites. In response to the increasing importance of snowfall as a precipitation component with increasing elevation, Pacific silver fir increases in dominance. This trend is also noticeable in early successional stages; at low elevations, western hemlock often forms pure stands after disturbances such as windthrow, whereas at higher elevations, Pacific silver fir will be found regenerating with western hemlock. There is also a change with increasing elevation from western red cedar to yellow cedar as a dominant seral species. This seral change is attributed to the climatic change becoming cooler with a shorter growing season. As well, yellow cedar is considered frost resistant as long as the unfrozen ground is well protected by snow, whereas western red cedar is not as frost tolerant (Krajina 1969). On the basis of the change in seral species, this forest zone has been subdivided into two subzones: the western red cedar subzone and the yellow cedar subzone.

Western red cedar subzone

The western red cedar subzone (CwH-aF:a) ranges in elevation from sea level to about 600 meters. Dominant precipitation is in the form of rain, with growing season precipitation ranging from about 350 to 800 mm. After evapotranspiration losses a climatic moisture surplus of from 100 to greater than 350 mm is left. The precipitation generally increases inland in the fiordlands and with an increase of elevation. Topography tends to channel some of the storms up the inlets and valleys, and annual rainfall has been measured as high as 6658 mm (at Henderson Lake). The subzone ranges from near Jordan River on the southwest coast, where the rainshadow effect of the Olympic Mountains is

greatly diminished, to Port Hardy and San Josef Bay near the north end of the island, where latitudinal effects of coolness and increased cloud cover are reflected by the loss of Pacific silver fir in climax forests. The freeze-free period within the western red cedar zone is relatively long, somewhat compensating for lower summer heat. The west coast, with its moderate air temperatures, protection from cold, dry interior air, and nearness to a relatively warm water surface often has high humidity (Tuller 1979). Often resulting in fog, this humidity decreases evapotranspiration rates and compensates for reduced precipitation at low levels on the outer coast.

The large amount of precipitation on the outer coast ensures that soils are constantly moist. The small annual range of temperature implies only slowly changing conditions within these moist soils (Schaefer 1978). Frost is absent in any but extreme surface layers. Decomposition of forest floor material will be slow, with a slow but continuous release of nutrients. Many of the soils are subject to continuous seepage, expressed in the profiles by higher organic content and duller colours rather than by gleying and mottling. This organic matter may reach 30 percent in the mineral soils. Soils may be highly productive, with mean annual increments of the forests exceeding $20 \text{ m}^3/\text{ha}/\text{yr}$ on better sites (Jungen and Lewis 1978).

Major vegetation landscapes are strongly differentiated on the basis of moisture regimes and soil drainage. Moderately well to well drained, deep soils on either morainal or colluvial materials support a climatic climax forested vegetation landscape of western hemlock and Pacific silver fir. Western red cedar is a frequent minor component within this landscape. In its role as a seral species, its great longevity results in being persistent even after turnover of the climax species. Its shade tolerance is such that occasional trees may even regenerate under a forest canopy. Understories are usually shrub and moss dominated, with Alaskan blueberry, red huckleberry, oval-leaved blueberry and rusty Pacific menziesia being common on the acidic soils. Tree regeneration is usually well advanced, so forest stands are distinctly uneven aged. Deer fern, often with western sword fern, may also be present, especial-

ly on moister sites where organic material is being added to the forest floor annually. Mosses may form a continuous mat on this organic material. Natural disturbance within this landscape is usually restricted to blowdown from wind storms, especially in hilltop or upper slope stands. Both western hemlock and Pacific silver fir will aggressively pioneer these sites, forming pure to mixed even aged stands that will slowly diversify in structure with increased age. Disturbances such as by logging will usually be followed by dominance of species from the predisturbance forest stand, with the possibility of invasion by fireweed and other weedy species only after slash burning.

On shallower sites, the forested sites support a scrubrier, less productive forest, dominated by western hemlock and western red cedar. This edaphic vegetation landscape usually has a very dense understory, dominated by salal, red huckleberry, rusty Pacific menziesia, and evergreen huckleberry. Herbs are rarely dominant, though a dense moss layer may be present. This landscape often occurs on shallow to bedrock sites that are southeast to south-west facing, in middle to upper slope positions. Seepage is short-lived, and increased evapotranspiration and lower nutrient availability result in sites with lower vegetative productivity. The western red cedar is often multitopped with several dead spikes.

On edaphically dry, shallow sites on strongly southerly facing slopes below about 200 meters near the coast, a forested vegetation landscape dominated by coast Douglas-fir and/or lodgepole pine is sometimes found. Evapotranspiration and runoff is higher than average, and the lack of a deep soil mantle to retain moisture probably results in some growing season moisture deficits. Bedrock outcrops are common. Nutrient supply may be from upslope seepage during wetter periods plus from breakdown of some of the finer-grained bedrocks. This vegetation landscape is patchy in distribution, being most noticeable on the immediate coastline from Muchalat Island north to Kyoquot Sound and along the rock faces north of Kelsey Bay. Trees grow very slowly, and are widely spaced. Patches of understory, dominated by salal, may occur in deeper soil pockets, but mosses are predominant over most of the exposed rock surface.

In winter, these sites are often free of snow for much of the winter, and therefore are important for wildlife winter range use (Janz, personal communication¹).

Another vegetation landscape of lower productivity is found on flatter marine or glaciofluvial material with high watertables and gleysolic soils. The forest is dominated by western hemlock and western red cedar, again in response to poor nutrient and oxygen availability caused by waterlogged soils. The coarser soils have cemented horizons that result in a perched water table. These gleysolic soil landscapes are dominant on the Estevan Coastal Plain and in the Saguash Basin (Holland 1976; Howes 1981). Understories are dominated by patchy shrubs, primarily salal and evergreen huckleberry. Western yew and Pacific crab apple are often associated with this vegetation landscape. The tree canopy may be dense but irregular with many spike-topped, old western red cedar.

With increasingly poorer drainage, shore pine becomes a dominant in a very open, patchy forest, with poor vigour western hemlock and western red cedar. This forested vegetation landscape is often referred to as a muskeg or bog forest (Harcombe 1972), and is restricted to the low lying coastal plains. Soils are generally gleysolic, tending towards organic, with a fibrisolic capping dominated by peat mosses. In this landscape, shrub cover is patchy and often in poor health; evergreen huckleberry and salal are dominant. The herb layer is composed of a selection of both forest and bog species, including goldthreads, twayblades, and deer fern. Nutrient availability is low due to poor aeration in the saturated soil, and tree growth is slow and irregular.

In the wettest areas, sites do not have the capability to grow a forested cover, and organic soil development becomes dominant. Soils are extremely acid and the decay of organic residues is inhibited by a lack of oxygen caused by

¹Janz, D. Personal communication. Fish and Wildlife Branch, Ministry of Environment, Nanaimo, British Columbia.

submersion and saturation. Peat is poorly decomposed (fibric) and precipitation provides the major input of water and nutrients. Peat mosses are the dominant ground cover in these bog vegetation landscapes. The ground surface is usually irregular and hummocky, with stunted shore pine, western red cedar, and yellow cedar growing on the drier hummocks. The shrub layer is highly variable and tends to be patchy. Common Labrador tea, bog kalmia, and poor-vigour salal predominate. Most herbs are nonforest species : goldthreads, sedges, tufted deer-grass, and sundews. Many of these organic landscapes are young, and there is some evidence to suggest that they will slowly expand by encroachment into the forests until the surface becomes domed enough to improve drainage and allow reestablishment by trees (Wade 1965).

Sitka spruce is a dominant in two vegetation landscapes within the western red cedar subzone. The spruce dominates a narrow strip along the exposed shoreline of much of the west coast, where its tolerance to salt spray on new growth allows it to survive where western hemlock and Pacific silver fir will die (Cordes 1972). These sites may be either old beach deposits or shallow colluvium over bedrock. Understories are usually dense salal with salmonberry and skunk cabbage more common in wetter depressions between old beach ridges or at the base of seepage slopes. On deeper materials, Sitka spruce has the capability for good growth. On wind-exposed areas, deformation and wind pruning can lead to a dense hedge-like appearance. Western hemlock may be a component of these stands in less exposed areas. On some sites, fern-dominated forest floors may be present; usually, the dense tree canopy allows only low light penetration for herbaceous growth. Disturbances in this vegetation landscape, beyond windthrow or occasional flooding from extreme high tides, is restricted to logging activities. Usually, understory shrubs will predominate immediately after disturbance, although slash burning may result in invasion by weedy species such as fireweed. The coastal area, with Sitka spruce as a characteristic species, has been described as a separate zone or variant of a zone by some workers (Packee 1974; Klinka 1978). These coastal strips are often covered with fog, and humidity is high for much of the year.

Sitka spruce is also a dominant component of the vegetation landscape on fluvial floodplains, apparently in response to higher levels of calcium and magnesium (Krajina 1969). The spruce will form an edaphic climax with western hemlock. On recently deposited or eroded gravels and sands, sites may be pioneered by red alder, which will in turn delay invasion by Sitka spruce. Understories vary from dense thickets of salmonberry and stink currant to open areas dominated by deer fern and western sword fern. These alluvial forests are usually highly productive, with some of the highest capability for tree growth in the Outer Coastal Region. There is usually an abrupt loss of Sitka spruce where the fluvial gravels meet the lower slopes of the valley sides.

A variety of nonforested vegetation landscapes are encountered along the immediate coastline. These range from exposed rocky outcrop and cliffs with salt-tolerant herbaceous plants and seaweeds through a variety of beach communities and occasional sand dunes to estuarine areas at the mouth of most rivers. The estuary vegetation landscape is usually abruptly zoned with bands of different plants, dominated by herbaceous species such as Lyngbye's sedge, tufted hair grass, Arctic rush, saltwort, and Pacific silverweed. Soils are saline, with a turfy top forming over the underlying fluvial materials as the estuary stabilizes and is inundated less in the daily tidal cycles.

Red alder is a common pioneer on sites after disturbance, especially when mineral soil or parent material has been exposed. These disturbances may be natural, from such events as stream erosion or mass wasting, to man-made by logging - the result is removal of the organic top of the soil. Red alder is an aggressive invader of such sites, partially because of high seed production and because of its ability to fix nitrogen, available to most other plants during decomposition of forest floor material. Alder leaf litter is rich in nitrogen so it supports a rich flora and fauna of decomposing organisms, including earthworms (Trappe and Bollen 1979). Reproduction of conifers is then retarded by dense shrubby understories, especially salmonberry. In many cases, this vegetation landscape may be considered an edaphic climax, since site conditions must change before secondary succession can proceed.

Yellow cedar subzone

The yellow cedar subzone (CwH-aF:b) of the Coastal western hemlock - Pacific silver fir zone ranges in elevation from about 550 to 1000 meters. The upper limit varies at least 100 meters, depending on aspect and distance inland, and the subzone usually grades slowly into the higher subalpine forests. This subzone is predominantly found in the Vancouver Island Ranges physiographic subunit and on higher hills in the Fiord-land subunit (Holland 1976; Howes 1981). Growing season precipitation, ranging from 500 to 850 mm, is predominantly rain, but snow is the common precipitation form in winter (Coligado 1982b). The extended snow pack and cooler temperatures with the increased elevation results in a shortened growing season compared to the lower western red cedar subzone. Time of occurrence of maximum snowpack is delayed sharply with increasing elevation; on the north central island area, maximum snowpack is in January at 300 meters but not until April at 1000 meters. Freeze free period in the subzone is 150 to 200 days (Coligado 1982b). Climatic moisture surpluses are high; even on warmer aspects, melting snow and growing season precipitation will usually keep soil moisture adequate for continual vegetative activity. Seepage is a common attribute within this subzone, normally found on middle to upper slope landscape positions. Ferro-humic podzol soil landscapes still predominate, although folisol (forest-origin organic soils) are commonly found on shallow to bedrock sites (Jungen and Lewis 1978). Because much of this subzone is on steep, rugged terrain, the most common parent material is colluvium, deposits of which are often shallow veneers overlying bedrock. These soils are deep (often between 1 and 2 metres), well to moderately well drained, and lack cemented horizons (Jungen and Lewis 1978). Morainal deposits are found along the lower valley slopes; these often have thick organic mats on their surface and heavy, indurated pans that channel water laterally and impede root penetration. Wetland organic soils are rare in the subzone except on higher plateau areas in depressions of terrain that collect water. Water courses are usually steep with fast flows; fluvial material deposition is not extensive.

Major vegetation landscapes are not as strongly differentiated, nor as varied, as in the lower western red cedar subzone, primarily because of less diversity in soil parent material. Most of the subzone has the potential of supporting forested stands, often with medium to high capability. The subzone is characterized by a climatic climax of Pacific silver fir and western hemlock on most sloping morainal and colluvial materials. On this landscape, Pacific silver fir tends to be the more dominant species due to its better capability of regenerating in areas with extensive snowpack (Thornburgh 1969). Understories are usually shrub-dominated, with Alaskan blueberry, oval-leaved blueberry, red huckleberry, and rusty Pacific menziesia. Salal may be present, but it is not as common nor as large as at lower elevations. The dominant herb is deer fern, and the moss layer is usually continuous and dense. On the deeper, moderately well drained sites, yellow cedar may be present as a long-lived seral species, with a life span known to exceed 1000 years (Franklin and Dyrness 1973); it may be present in a climax old growth stand for two or three generations of Pacific silver fir or western hemlock. Western red cedar may also be present in lower parts of the subzone. Natural disturbances in this vegetation landscape are uncommon, usually associated with either blowdown from wind or mass wasting on steep slopes. Both western hemlock and Pacific silver fir will regenerate quickly on blowdown areas, often existing suppressed regeneration will release and help form a stand structure similar to that of an even-aged stand. After mass wasting, raw parent materials are usually exposed; these sites will be pioneered by red alder and replacement by conifers will be very slow. The main man-induced disturbance is logging; shrubs surviving after tree removal may be temporarily dominant. Suppressed trees from the leftover regeneration plus new hemlock and Pacific silver fir seedlings will form a new tree layer. This successional sequence will occur slower than on corresponding sites in the western red cedar subzone since the higher logged openings will sometimes retain extended snowpack and the climate is less favourable. Slash burning is rare at these elevations, and fire-induced succession is uncommon.

On sloping sites with pronounced seepage, yellow cedar may form a mixed canopy with Pacific silver fir; this vegetation landscape would be considered

an edaphic climax. These highly productive sites produce tall, large diameter trees and an open understory of scattered shrubs, few herbs, and a dense moss carpet. Nutrients are supplied by subsurface seepage and some downslope movement of organic material and nutrients. Western hemlock apparently prefers soils which supply low amounts of nutrients (Krajina 1969). Disturbances are often by minor blowdown that creates openings in the tree canopy; natural regeneration quickly fills in these sites, responding to more abundant light. After logging, existing plus newly-seeded trees will predominate after only a few years in the absence of slashburning. Initially, existing understories may temporarily dominate.

On shallow to bedrock sites, there is little change in tree composition. At higher levels in the subzone, mountain hemlock is sometimes found with western hemlock and Pacific silver fir. On flatter upper slope or apex areas, the deep extended snowpack may cause the forest to open up, giving it an upper subalpine appearance. Also associated with these openings may be organic soil development; if freely drained, these organics will be composed of forest humus and support a stunted mixture of western hemlock, yellow cedar, and/or Pacific silver fir. If the sites are not freely drained, then wetland organic soils will be present, composed of decaying peat mosses, sedges, and grasses. Yellow cedar and shore pine are common indicators of these fibric-textured organics. Soils are saturated throughout the short growing season, and nutrient availability is low in the acidic moisture regime.

3.2.1.2 Subalpine mountain hemlock - Pacific silver fir zone

The Subalpine mountain hemlock - Pacific silver fir zone (SA mh-aF) of the Outer Coastal Region ranges in elevation from about 950 to 1800 meters. The lower portion of the zone intergrades into the Coastal western hemlock - Pacific silver fir zone. On steeper north-facing slopes and in some valleys under the influence of cold air drainage, the subalpine zone occurs at a lower elevation than on south-facing slopes. The upper limits of the zone are either the height of land, exposed bedrock with insufficient soil to support tree

growth, or the Alpine tundra zone. Because of the relatively recent glacial history within the Vancouver Island Ranges physiographic subunit in which the subalpine zone is found, site conditions generally become limiting to tree establishment and survival before macroclimatic influences exclude trees. The upper boundary of this zone is defined on the basis of potential tree distribution, however stunted ("krummholz") the trees may appear. Because of the frequency of bedrock at this upper limit, mapping the upper extent of the Subalpine mountain hemlock - Pacific silver fir zone was not attempted (see Volume 3).

The major macroclimatic processes influencing this forest zone are orographic uplifting of moist air and the interrelated cooling of the air associated with increasing elevation. This results in the two most important climatic attributes of this zone: snow as the dominant form of precipitation and a growing season that is shorter, with a freeze free period of less than 150 days. Measured climatic data are uncommon for this zone, so quantitative estimates must be extrapolated. Average February to May snowfall is probably in the range of 150 to 300+ cm within the elevational range of the zone, as measured for north central Vancouver Island, with the time of maximum snowdepth being about mid-April (Coligado 1982b). These values will probably be lower and earlier respectively in areas closer to the maritime influence. Wind is usually not an important influence on vegetative growth on the coast and soils do not freeze deeply because of the continuity of deep snow cover (Brooke et al. 1970). The freeze free period may not be directly related to vegetative activity because temperatures may be above freezing for a long period before removal of snow cover allows photosynthesis to take place. However, Brooke et al. (1970) have measured almost immediate vegetative activity after snow melt, based on positive net photosynthetic rates. Especially with the low understory species, the snow-free period may be more critical than freeze free periods.

The Subalpine mountain hemlock - Pacific silver fir zone is characterized by a climatic climax forest of mountain hemlock and Pacific silver fir on deep moderately well to well drained sites. Both tree species are tolerant of deep,

wet coastal snow and a relatively short growing season. The shade tolerance of Pacific silver fir is considered to be slightly higher than that of mountain hemlock (Krajina 1969); this may be reflected in a higher proportion of Pacific silver fir in the regeneration layer of some forests. This imbalance in regeneration has also been attributed to the limber nature of mountain hemlock seedlings, easily buried by litter accumulation on the top of snow (Thornburgh 1969), so regeneration is more restricted to rotten logs, stumps, and upturned roots. Thornburgh (1969) also postulates that openings in the stand favour mountain hemlock because of early snow melt and a smaller chance of being buried by debris. Forest cover is not continuous throughout the forest zone. At higher elevations, trees tend to become clumped and patchy, and often their growth reflects the more adverse environment by becoming stunted and bushy. On the basis of this change in growth form and forest structure, this forest zone has been subdivided into two subzones: the forested subzone and the parkland subzone. Because of problems with mapping scale and a dominant inclusion of bedrock in many upper subalpine areas, these subzones were complexed on the forest zonation maps (see Volume 3).

Forested Subzone

The forested subzone (SA mH-aF:a) of the Subalpine mountain hemlock - Pacific silver fir zone ranges in elevation from about 950 to 1400 meters, although the upper limit is variable due to differences in general topography and climate. Besides the continuous forest cover, this subzone is also characterized by some forest understory species such as Alaskan blueberry, oval-leaved blueberry, and rusty Pacific menziesia, and the possible presence of western hemlock as a minor component of lower elevation stands. The actual lower limit of the subzone is determined by the higher proportion of mountain hemlock over western hemlock in forested stands. Four major vegetation landscapes can be described for this subzone.

On deeper surficial materials, a mixed forest of mountain hemlock and Pacific silver fir occurs, with a shrub-dominated understory of Alaskan

blueberry and rusty Pacific menziesia. Coniferous regeneration is also common, dominated by Pacific silver fir. The mountain hemlock grows predominantly on fallen logs and thick organic forest floor material. Forest productivity is generally low, because of the short growing season and deep snow. Disturbed sites generally succeed directly back to the climax species; in the absence of burning, sites may be initially shrub-dominated, with the coniferous component provided by formerly suppressed regeneration.

Sites with a major seepage component support a more productive forest, usually dominated by Pacific silver fir and yellow cedar, with mountain hemlock restricted to drier knolls. The two dominant tree species respond well to richer sites receiving additional nutrient input from upslope seepage. Krajina (1969) suggests that both species favour rich sites. These forested sites are often intermixed with wetter seepage runnels supporting a diversity of herbaceous species including false green hellebore, marsh marigold, and gold-threads.

Shallow to bedrock sites, usually associated with upper slope or apex slope positions, support the least productive forests. Mountain hemlock predominates, although stunted yellow cedar may also be present. The soil, if it contains a mineral component, is heavily leached. A well developed organic capping is usually present, in which the majority of tree roots is found. Shrub distribution is generally patchy, as may be the tree cover. When the trees are clumped, the open sites with very shallow soils may be dominated by red mountain-heather, Merten's cassiope, and luetkea.

Wetter areas with an extended snow pack or continual surface seepage may lack the capability of tree growth. Soils develop a turfy top from the predominance of grasses and sedges. Small ponds of open water may occur on these sloping organics, so a rich diversity of herbaceous plants is often present. Conspicuous species could include dodecatheon, green false hellebore, and leptarrhena.

Parkland Subzone

The parkland subzone (SA mH-aF:b) of the Subalpine mountain hemlock - Pacific silver fir zone may occur above about 1350 meters, however, variations in topography result in considerable variation in this limit. The upper elevational limits, given suitable surficial material for tree growth, is about 1800 meters. Invariably, bedrock is encountered before this elevation is reached. The parkland subzone is characterized by a predominance of mountain hemlock, and open areas lacking trees because sites are either too shallow or too wet. Tree establishment is restricted to areas of earlier than average snow melt. The dominant shrubs associated with the tree clumps are black blueberry and rusty Pacific menziesia. The trees are usually stunted, often broken-topped from snow loads, and have a bushy appearance. White-flowered rhododendron is only an occasional component of these clumps in the Outer Coastal Region. Extensive drier areas between tree clumps support species such as red mountain-heather, Merten's cassiope, Cascade blueberry, crowberry, and luetkea. Wetter areas, receiving a large amount of snow melt water, are dominated by moisture-loving species such as green false hellebore, marsh marigold, leptarrhena, and Sitka valerian. The slowest snow melt areas are usually dominated by black alpine sedge. All these species are usually associated with ponded areas or slow-moving, high order streams (Shera and Grant 1980).

The distribution of snow, time of snow melt, and depth of surficial material are the dominant factors governing plant distribution in this subzone. Though disturbances other than possible avalanching or mass wasting are uncommon, revegetation will be very slow and the reestablishment of trees may be impossible if disturbances result in changes to the snow accumulation and melt regimes. Trees tend to be restricted to warmer ridgetops where some snow is removed by wind, and to higher, well-drained areas with a dominance of forest floor organic accumulations. Productivities are very low.

3.2.1.3 Alpine Tundra Zone

The Alpine tundra zone (At) of the Outer Coastal Region is generally found above 1800 meters to the height of land. This zone is distributed only on a few higher mountains, and even there, is dominated by bedrock. The climate is too severe for the establishment of trees, even in a krummholz form. The dominant form of precipitation is snow - however, lack of climatic data from this zone makes any exact description of the climate impossible. Because of recent glaciation, little surficial material suitable for supporting plant growth exists. Some higher peaks may be continually covered with snow or ice, especially on north faces. Topography is generally very steep, with rock falls common. Isolated pockets of soil material may support plants such as red mountain-heather, Merten's cassiope, saxifrages, and lichens. No attempt was made to map this zone; it was complexed with the Subalpine mountain hemlock - Pacific silver fir zone (see Volume 3).

3.2.2 Hecate Section

The Hecate Section of the Outer Coastal Region is restricted in geographical extent on Vancouver Island to the northern portion of the Nahwitti Plateau (Figure 3) (Holland 1976; Howes 1981). The dominant macroclimatic processes are onshore processes (Marsh 1983); the low rolling relief has little impact on orographic lifting. This forest section is characterized by a low elevation climatic climax of western hemlock and western red cedar and by the absence of a distinct subalpine zone. The climax tree species are aggressive pioneers on disturbed sites. However, the wet climate combined with low radiation results in low evapotranspiration for most of the growing season, and soils remain saturated even where they are freely drained. Disturbed sites may not regenerate to their original forested states. Organic soil development is common and is often initiated by tree removal; this development may not be reversible.

3.2.2.1 Coastal western hemlock - western red cedar zone

The Coastal western hemlock - western red cedar zone (CWH-wC) occupies almost the entire area designated as the Hecate Section of the Outer Coastal Region. This forest zone occurs from sea level to an elevation of about 500 meters, and is limited to the northern portion of the Nahwitti Plateau at the extreme northern end of Vancouver Island. Temperatures are generally cooler during the growing season compared to the area to the south. The dominant influence of extensive oceanic contact results in high humidity, frequent cloudiness, and the lowest hours of sunshine for the region. Evapotranspiration is thus low, causing high climatic moisture surpluses. The subdued topography and infrequent drainage systems result in high soil moisture and commonly saturated conditions. These cool, wet conditions result in a slow but continual accumulation of organic material under coniferous forested cover - this accumulation and decomposition of the organic forest floor material can be considered the dominant soil-forming process (Luttmerding 1981). Under a forested cover, this organic matter is primarily from coniferous trees and ericaceous shrubs. The sites are considered to be freely drained, though seldom dry, in that they do not have a high permanent groundwater table. A proposed revision of soil classification (Luttmerding 1981) would consider these soils to be folisols or folisolic phases of mineral soils. It is postulated that removal of forest vegetation tends to favour wetland organic soil development by upsetting the evapotranspiration rates, reducing canopy interception of precipitation, and causing excessive saturation of the soil surface. Surface vegetation tends to reflect the present direction of soil development - wetland vegetation growing on sites without deep accumulations of peat after removal of the forest by burning or land clearing. There is evidence that fire, though rare in this humid environment, is sometimes responsible for patchy removal of the forested cover and much of the forest floor accumulation. If the surface organic matter is removed down to the level of the saturated mineral soil surface, field examination indicates that soil processes will then proceed in a wetland organic direction rather than recovery to an "upland" organic-capped soil supporting a forest cover. This trend is not clear, however, since there

is also evidence of encroachment of forest onto deep, domed, peaty wetlands (bogs). The dynamic nature of these processes seems to be in balance; radical disturbance of either process by events such as fire or land clearing may be enough to reverse or delay the dominant soil-forming processes.

Only a single subzone, the shore pine subzone, has been delineated for the Coastal western hemlock - western red cedar zone. This subzone is characterized by a scrubby, open climatic climax forest dominated by western hemlock and western red cedar. This vegetation landscape is widely distributed, and quite variable. Shore pine and yellow cedar may be associates in the tree layer, although western hemlock is the dominant regenerating species. Understories are shrub dominated, with salal, rusty Pacific menziesia, red huckleberry, and evergreen huckleberry commonly encountered.

Western hemlock regeneration, though sometimes common, is found only on drier hummocks, such as fallen logs or accumulated forest floor material. Herbs are not well developed under the shrub layers and are often patchy in distribution; species most common include Canadian bunchberry, deer fern, twayblades, and cut-leaved gold-thread. The moss layer is dense and may be composed of a predominance of forest species, though Girgensohn's peat moss may be present. The forest often has many small scale wetter pockets, sometimes with American skunk cabbage or rein orchids and more shore pine and yellow cedar. This forested landscape has been referred to as a muskeg forest (Harcombe 1974; Pojar and Annas 1980); it closely resembles the edaphic forests found on the Estevan Coastal Plain. Tree productivities are very low. The moisture regimes are considered wetter than average; these regimes result in poor aeration for parts of the growing season and low nutrient availability. Tree growth is stunted, often deformed and in poor vigour.

This forested vegetation landscape is commonly broken up by organic wetlands on both flat and sloping topography. These wetland vegetation landscapes reflect a range of ages and sites, from young wetlands with only a thin capping of organic material and sedge-dominated to deep blanket bogs that cover a range

of microtopographical features of the underlying substrate. Various sedges and tufted deer-grass are common, with increasing peat moss with increasing age. Drier sites, though still organic, may have species such as crowberry or alpine azalea. Older wetlands have a very hummocky nature and a greater diversity of both herbaceous and shrubby species. Trees, though very stunted and often of poor vigour, may be clumped on slightly higher hummocks. Forest shrub species, such as salal, may be mixed with common Labrador tea or swamp kalmia. Peat mosses are common, especially on deeper organics where they form the dominant input into the wetland peat. Water in these wetland landscapes is very acidic, and nutrient availability is low.

Along the major water courses, with improved drainage in fluvial deposits and steepened side slopes, soil water is moving and better aerated. This results in improved nutrient availability and a more productive vegetation landscape. These forests, though limited in extent, are generally dominated by Sitka spruce and western hemlock. Understories may be either shrub or fern dominated. A narrow belt of Sitka spruce is also found on coarse textured beach deposits and better drained coastal margins subject to excessive salt spray.

3.2.2.2 Subalpine mountain hemlock zone

A distinctive subalpine zone was not mapped within the Hecate Section of the Outer Coastal Region. However, there are indications of a subalpine zone of limited extent above about 500 meters, where mountain hemlock is found on some sites, both forested and organic. Because of the absence of Pacific silver fir, it would have to be considered a distinct new zone: Subalpine mountain hemlock zone (SA MH). Associated species include yellow cedar, shore pine, western red cedar, and western hemlock. The increased distribution of mountain hemlock may reflect areas of deeper snow accumulation and/or cold air drainage, however lack of climatic data and only small areas above 500 meters makes any further descriptions impossible without a better understanding of vegetation and climate along the mainland coast north of about 51°N latitude.

3.3 INNER COASTAL REGION

The south and eastern areas of Vancouver Island, and the major interior valleys, are within the Inner Coastal Region (Figure 3). This forest region, within the two drier variants of the Pacific coast climate (see Chapter 2.2), is characterized by one dominant macroclimatic process: coastal rainshadow (Marsh 1983). Marsh further separates this climatic zone into two subdivisions: a subdivision that is still partly influenced by the carryover precipitation from the orographic processes to the west and by coastal air coming through the mountain passes and a subdivision that is drier and even more in a rainshadow. The effect of the macroclimatic process of rainshadow is strongest at sea level, weakening with increasing elevation and strengthening with increasing eastward movement. The Pacific air masses are descending, giving less rainfall and less cloudiness than in the Outer Coastal Region. Radiation values are higher, with more hours of sunshine. Subsequently, growing season precipitation is much lower and climatic moisture deficits become increasingly more common. Winters are mild and soil freezing and frost are not major factors influencing vegetative productivity.

Soils are moist to dry over most of the year, with soil moisture deficits common in the growing season. Soils rarely freeze, though snow is only dominant at higher elevations where it does have an insulating effect. Jungen and Lewis (1978) describe two major soil landscapes for the Inner Coastal Region: humo-ferric podzol and brunisol soil landscapes. The humo-ferric podzol soil landscape is the predominant landscape on the Nanaimo Lowland and Alberni Basin. Areas are usually gently sloping to moderately rolling, but include areas of steeply sloping, rugged terrain along mountain slopes. The whole landscape has been glaciated, and morainal, colluvial, fluvial, and marine materials comprise the main surficial deposits. These podzolic soils are well to moderately well drained, with low pH values of 4.0 to 5.0, and low base saturations. Textures are predominantly coarse to medium. Where long term seepage occurs and at higher elevations, levels of organic matter are sufficiently high to classify the soils in the ferro-humic podzol soil landscape. An

indurated pan is commonly found in gravelly fluvial and morainal materials, with the degree of cementation varying from weak to strong. This pan can effectively be a barrier to root penetration. Colluvial deposits in this soil landscape are deep to shallow veneers overlaying bedrock. B horizons are deeply weathered, the soils are well to rapidly drained, and endurated pans are absent.

The dystric and sombric brunisol soil landscapes are restricted to the southeastern area of the Island. Precipitation is lower and soil leaching is not as intense as in the humo-ferric podzol soil landscape. Major parent materials include medium to coarse textured marine. Sombric brunisols occur on the driest sites, associated with open Garry oak communities. It is usually found below elevations of 50 m where effective moisture is lower than in the dystric brunisol soil landscape. Soils are moderately to slightly acidic and have low to moderate base saturation. Soil moisture deficits are very common during the growing season.

The major coniferous tree species at low elevations in the Inner Coastal Region are western hemlock, coast Douglas-fir, western red cedar, and grand fir. With increasing elevation, Pacific silver fir may become a component of stands and then western hemlock is replaced by mountain hemlock. In the climatically drier southeast area, grand fir and western red cedar appear to form the climatic climax, at least theoretically. However, the area has been intensively disturbed over the last two centuries by logging, burning, agriculture, housing, and other human activities, and old growth stands are rare. The remaining forested areas are dominated by seral, second growth forests dominated by coast Douglas-fir. However, grand fir and/or western red cedar are the dominant species regenerating under a dense closed tree canopy. Coast Douglas-fir is also dominant along the rest of the east coast area, where disturbances have also been intensive. Western hemlock becomes increasingly a more common regeneration species under the coast Douglas-fir with increases in growing season precipitation and with increases in the depth of forest floor organic material. Coast Douglas-fir is a very long-lived seral species, after

remaining dominant in forested stands over 250 years old (Franklin et al. 1981). Ecologically, it lacks shade tolerance except on dry sites, where tree canopies are fairly open. It has only moderate nutritional requirements, has low frost tolerance, can survive soil moisture deficits, and prefers sites with little coniferous forest floor accumulations because it requires nitrates for its nitrogen supply rather than ammonium compounds (Krajina 1969).

There are conflicting reports on the true ecological role of coast Douglas-fir (Krajina 1969; Franklin et al. 1981). Krajina states that coast Douglas-fir is shade tolerant on mesic sites after natural thinning within the Coastal Douglas-fir biogeoclimatic zone (mapped on much of the Nanaimo Lowlands by Krajina [1969], Packee [1972], and Klinka et al. [1979]) and therefore forms the climatic climax for that zone. Franklin and Hemstrom (1980) state that Douglas-fir is a shade intolerant species that will only form self-perpetuating stands on habitats too dry for western hemlock or grand fir - on other sites, it performs only a long-lived pioneering role. Franklin et al. (1981) state that though many 350 to 750 year-old forests retain a significant component of Douglas-fir in the dominant tree canopy and will continue to do so for several centuries, it is a subclimax species on most sites subject to replacement by more shade tolerant associates. They also state that true climax forests lack the large dominant Douglas-firs and have tree layers of one or two shade tolerant tree species which usually do not get as large. Using the biophysical approach to classification, this author agrees with the conclusions of Franklin and his associates. Based on field data from Vancouver Island, coast Douglas-fir is not a common regenerating species under its own dense canopy and therefore is not considered to form a climatic climax forest.

At higher elevations, where total precipitation and snowfall are higher, the climate is more comparable with that of the Outer Coastal Region of similar elevations. Pacific silver fir becomes a codominant with western hemlock, with yellow cedar as a seral species on some moist, deeper soils. Coast Douglas-fir, however is still a seral species in some areas, unlike in the Outer Coastal Region. With an increase in the dominance of the subalpine climate,

mountain hemlock replaces western hemlock. Mountain hemlock appears to be more dominant than Pacific silver fir at these higher elevations, possibly because sites are drier than the subalpine in the Outer Coastal Region.

3.3.1 Quadra Section

The Quadra Section is the most widespread forest section within the Inner Coastal Region (Figure 3). It includes the eastern parts of Vancouver Island and two large interior valley systems: the Alberni Basin and the Nimpkish River Valley (Holland 1976; Howes 1981). The dominant macroclimatic process region is coastal rainshadow, with descending and drying Pacific air. This section is wetter than the Malahat Section (see 3.3.2) because of the lesser rainshadow effect of the Olympic Mountains and the encroachment of some of the moister Pacific air through mountain passes and valleys (Marsh 1983). Growing season soil moisture deficits are common, though they are diminished with an increase north and/or west and at higher elevations. This forest section is characterized by a low elevation climatic climax forest of western hemlock, changing to a mixed climax of western hemlock and Pacific silver fir. Some very high areas lack the capability of supporting tree growth. Coast Douglas-fir is a dominant seral species for much of the section, with western hemlock sharing this ecological role more as precipitation increases. Disturbed sites usually regenerate to long-lived deciduous and coniferous seral species, though climatic climax species will establish faster than within the Malahat Section.

3.3.1.1 Coastal western hemlock zone

The Coastal western hemlock zone (CwH) is the characteristic zone of the Quadra Section of the Inner Coastal Region. It ranges in elevation from sea level to about 900 metres, and is found along the east coast from Nanaimo north to Kelsey Bay. Physiographic subunits include the Nanaimo Lowlands, Alberni Basin, and lower elevations of the Vancouver Island Ranges. The major macroclimatic feature influencing this zone is rainshadow, with the Pacific air masses descending and drying with movement eastward. The rainshadow is

primarily provided by the Vancouver Island Ranges, with little influence from the Olympic Mountains. Growing season precipitation is invariably exceeded by potential evapotranspiration, therefore, sites without additional moisture supplies will have vegetative growth limited by moisture deficits. For most of this forest zone, dominant precipitation is rainfall, with only small additions from snow during usually mild winters.

The Coastal western hemlock zone is characterized by a climatic climax forest of western hemlock on deep, well-drained sites. Coast Douglas-fir is the dominant seral species on most disturbed sites. Moisture deficits generally decrease from east to west and south to north, and western hemlock becomes increasingly more dominant earlier in forest succession. Forest productivities also increase in this direction, and dominant soil processes become more strongly podzolic. This improvement in forest productivity and an increase in the role of western hemlock in early succession has been used as a basis for a subdivision into two subzones: the coast Douglas-fir subzone and the western hemlock subzone.

Coast Douglas-fir Subzone

The coast Douglas-fir subzone (CWH:a) of the Coastal western hemlock zone ranges in elevation from sea level to about 500 m. Within the Quadra Section, this subzone forms a coastal belt from Nanaimo north to Campbell River, with an isolated pocket in the Alberni Basin. Dominant precipitation is in the form of rain, with growing season precipitation ranging from about 180 to 250 mm. After evapotranspiration losses, a climatic moisture deficit of about 150 to 250 mm is left; this factor is of prime importance to the distribution of vegetation. There is a small increase in May to September precipitation as one moves inland towards the western hemlock subzone, but there is little topographical relief in this area to cause much increase in precipitation with elevation. The freeze-free period is relatively long (about 160 to 200 days), increasing eastwards towards the Strait of Georgia. The subzone may be subjected to occasional outbreaks of Interior cold air during the winter, but

winters are generally mild, with only very low snowfall. The subzone has been delineated on deer habitat maps within an area with less than 12 cm of accumulated snow on April 1 (Stordeur 1981).

High evapotranspiration rates, combined with low growing season precipitation, result in soils that become dried out for much of the summer. This lack of available moisture is reflected in the vegetation and has resulted in frequent past disturbance by fire. Forest floor material is shallow to absent, and soil organic matter is low; decomposition is rapid and therefore accumulations are slow. Soils are not strongly leached, though they are generally acidic. Most forest stands not destroyed by fire have been disturbed by logging or other land clearing activities. Much of the land area within this subzone has been alienated for residential, industrial, and agricultural uses. Forest productivities are medium to high, with the best sites receiving supplemental moisture from seepage. Morainal, fluvial, and marine deposits are the dominant surficial materials.

Major vegetation landscapes are strongly differentiated on the basis of moisture regimes and surficial materials. Because of the intensive land use activities within the past century, most sites still covered with native vegetation are in successional stages. The anticipated climatic climax is a forest dominated by western hemlock, with a dense shrub understory of salal and dull Oregon-grape. Common herbs would be American vanilla leaf, Pacific trailing blackberry, and northern starflower, with a dense moss layer dominated by euryhynchium and hylocomium mosses. Successional stands have similar understories but are dominated by coast Douglas-fir with varying amounts of western hemlock regeneration slowly establishing. Western bracken is a common herb in successional stands. Successional stands generally have better tree productivity and size than climax stands. It is anticipated that succession, without any further disturbances, will take at least 1000 years to reach a true climatic climax.

On drier-than-average sites, Pacific madrone is mixed with the coast Douglas-fir as another seral species in the tree canopy, often with ocean spray

in the tall shrub layer. Western red cedar often forms a dense regenerating layer, though western hemlock is sparse to absent. Regenerating coast Douglas-fir is restricted to openings in the existing tree canopy, stand margins, or to extremely open-canopied stands on very shallow materials. Parent materials are generally morainal or fluvioglacial, with western red cedar more prominent on fine to medium textured sites. Most of the forest floor accumulations were lost during the disturbances. Amenable climatic factors allow good decomposition of much of the organic matter, so forest floors only accumulate slowly and are generally shallow. Some sites in the climatically driest areas may have little or no western hemlock regeneration. This is most probably because of lack of available seed. During most summers, the soil moisture deficits may be too severe for western hemlock seedling survival. However, it is thought that once the trees have been established for a number of years, they are able to survive periods of drought, though growth may be stunted and productivities low. Increased insulating organic matter under more mature stands reduces severe moisture deficits and western hemlock may regenerate only after that stage is reached.

Dry sites with rapid drainage and lower nutrient availabilities, as on coarse glaciofluvial deposits, may support lodgepole pine as a codominant seral species with coast Douglas-fir. Understories are shrub dominated, with salal and dull Oregon-grape, with few herbs and an underlying moss layer. These sites may lead to an edaphic climax of coast Douglas-fir.

On shallow to bedrock sites, three distinctive different vegetation landscapes are encountered. An uncommon type, restricted to the coastal margin of this subzone, is dominated by Garry oak growing in deeper soil pockets on extensive bedrock outcroppings. Summer drought is very severe, so herbaceous species flower very early in the spring while some moisture is still available. Another uncommon landscape has an overstory of coast Douglas-fir and lodgepole pine, with common selaginella covering much of the exposed rock. Nutrient availability is low, as is forest productivity. A common landscape on shallow sites is dominated by coast Douglas-fir and Pacific madrone. These sites are

climatically moister than those with Garry oak, with a very variable herbaceous component. Shrub understories are dominant, usually with salal, dull Oregon-grape, baldhip rose, and sometimes bristly manzanita.

Moister-than-average sites are indicated by vegetation landscapes having a greater component of western hemlock, earlier in successional stages, and lessening of the density of the shrub canopies. Red huckleberry is a component of this shrub layer, and an increasing cover within the herbaceous layer is found. Western sword fern becomes more predominant, usually in association with American vanilla leaf, and salal is sparse to absent. Western red cedar may be a codominant regenerating species with western hemlock. Grand fir is occasionally found, especially on the fine textured marine soils.

Forested sites with intense disturbance may be pioneered by deciduous species, primarily red alder and/or bigleaf maple. Understories are diverse and varied, depending upon nature and intensity of disturbance, available seed source, and other factors. Red alder stands on floodplain gravels usually have dense shrub understories of salmonberry and western thimbleberry, and coniferous regeneration is slow and sparse. Black cottonwood may also be the dominant tree species on these floodplain sites; however, the predominance of agricultural land along the coastal plain rivers has removed most forest stands.

Western hemlock subzone

The western hemlock subzone (CwH:b) of the Coastal western hemlock zone ranges in elevation from sea level to about 900 m. Within the Quadra Section, this subzone forms a belt inland of the coast Douglas-fir subzone from Nanaimo north to Campbell River and covers the bottom of most major inland valleys except for the drier portion of the Alberni Basin. North of Campbell River, it reaches the east coast as far north as Kelsey Bay. It stretches west from Campbell River through the major valleys to Gold River, and then northward to Nimpkish River and Nimpkish Lake. Dominant precipitation is in the form of rain, with growing season precipitation ranging from about 200 to greater than

350 mm near the Outer Coastal Region (e.g. Alberni Inlet, Nitinat River). After evapotranspiration, the calculated remaining climatic moisture ranges from a deficit of 150 mm to a surplus exceeding 200 mm. Coligado (1982b) has not mapped climatic parameters in the entire subzone due to lack of sufficient data in some remote areas, so defining the upper limits is not always exact. However, there is a trend toward wetter summers with both an increase in elevation and a decrease in distance to the Outer Coastal Region. The freeze-free period is relatively long (about 120 to 180 days); however, portions of the subzone have significantly lower freeze-free period than the warmer coast Douglas-fir subzone. The western hemlock subzone is also occasionally subjected to outbreaks of cold Interior air during winter months. The subzone has been delineated on deer habitat maps within an area having 12 to 60 cm of accumulated snow on April 1 (Stordeur 1981).

If the coast Douglas-fir subzone could be considered to be "dry" during the growing season, the western hemlock subzone would be "moist". There is a lower moisture stress during the growing season, reflected by faster invasion of seral stands by western hemlock regeneration and more mixing of western hemlock in the main tree canopy in maturing seral stands. Forest floors have greater accumulation of organic matter. Disturbances are primarily restricted to fire and logging, with much less agricultural or residential activities. Soils are more strongly leached with a preponderance of podzolic rather than brunisolic soil development. Forest productivities are medium to very high; coast Douglas-fir reaches its greatest productivity within this subzone, though most second growth stands have been removed by logging. Morainal, fluvial, and colluvial deposits are the dominant surficial materials.

Major vegetation landscapes are strongly differentiated on the basis of moisture regimes and surficial materials, though differences on morainal or colluvial deposits may be more a function of rooting depth. As with the coast Douglas-fir subzone, the majority of sites still covered with native vegetation are in successional stages. However, the more advanced growth of western hemlock allows a more precise description of succession and climax, as remnant

climax stands (or overmature seral stands) are more common than in the drier subzone. Because coast Douglas-fir has been extensively planted on logged sites, second growth stands may provide a biased example of young to maturing seral vegetation. The climatic climax vegetation is a dense forested vegetation landscape, dominated by western hemlock. The understory is relatively open, with scattered ferns and a dense moss layer. Tree regeneration of all heights is present. The forest floor is hummocky from frequent windthrow of trees, and organic material is of intermediate depth. Successional stages have a slightly denser understory with more shrubs, and are usually dominated initially by coast Douglas-fir. If the site has been logged and burned, young succession proceeds through a fireweed stage with various surviving shrubs to the young tree stage. Western hemlock regeneration is usually evident, even in early succession. Once the coast Douglas-fir is established on the unshaded site, no more will regenerate. However, it still will take more than one generation of western hemlock to reach the climatic climax due to the longevity of the coast Douglas-fir. The understory in successional stands probably resembles a climax condition long before the tree canopy achieves that ecological state. Any openings in the tree canopy will favour shrubs over herbaceous ferns.

On drier-than-average sites, coast Douglas-fir is more dominant in the vegetation landscape; western hemlock regeneration is sparser and much slower to become established. Pacific madrone is a common associated seral species. Understories are more shrub dominated, principally by salal and dull Oregon-grape. Shrubs will be very dominant after disturbance unless a very hot fire occurs.

Reestablishment of conifers will be slow because of longer and more intensive summer moisture deficits. If these drier sites are south-facing or on very shallow material, succession may lead to coast Douglas-fir edaphic climaxes, with an open tree canopy. On these very dry sites, lodgepole pine may also occur, however, Garry oak is absent. Shrubs are still favoured over herbaceous species.

As in the coast Douglas-fir subzone, coarse textured fluvioglacial materials may support a mixture of coast Douglas-fir and lodgepole pine, with dense understories of salal, dull Oregon-grape, bracken, and mosses. Surprisingly, western hemlock may be found regenerating in these stands. However, extreme moisture deficits in most summers makes the possibility of western hemlock surviving in the climax forested state unlikely.

Moister-than-average sites, either as result of upslope seepage or fine-textured materials, support vegetation landscapes with a greater component of western hemlock. Shrubs may be rare to absent, and western sword fern is the predominant understory species. These sites may be initially dominated by deciduous tree species, especially bigleaf maple.

A varied number of forested landscapes may occur on the extensive fluvial floodplains. Usually deciduous dominated, red alder and/or bigleaf maple or black cottonwood are the common tree species. Both western hemlock and Sitka spruce may be the regenerating coniferous species. Understories range from dense salmonberry thickets to more open shrub-herb combinations with great species diversities. On poorly drained sites, American skunk cabbage is evident, often associated with foamflowers and western red cedar. If a high watertable persists for much of the growing season, trees may be absent and the vegetation landscape may be dominated by hardhack and a variety of sedges. These hydric sites are not restricted to floodplains and are common in depressional areas on morainal blanket deposits. Devil's-club is very indicative of sites receiving seepage waters from upslope, and is commonly found in the toe of slope positions, especially in smaller inland valley systems and along the base of the major mountain ranges.

Intensively disturbed upland sites may also be pioneered by red alder. This is especially noticable along old logging roads. Understories are diverse and varied, depending upon available seed sources and nature of disturbance. Wall-lettuce and various grasses are commonly found in association with these red alder stands.

3.3.1.2 Coastal western hemlock - Pacific silver fir zone

The Coastal western hemlock - Pacific silver fir zone (CwH-aF) is located above the western hemlock subzone of the Coastal western hemlock zone within the Quadra Section. It ranges in elevation from about 700 to 1100 meters throughout this Section in the Vancouver Island Ranges physiographic unit. The major macroclimatic feature influencing this unit is high precipitation and greatly diminished effects of a rainshadow. Growing season precipitation usually exceeds potential evapotranspiration, though small climatic moisture deficits may occur in lower parts of the zone. Though the dominant form of precipitation is rain, snow is common during the winter months.

The Coastal western hemlock - Pacific silver fir zone is characterized by a climatic climax forest of western hemlock and Pacific silver fir on deep, well-drained sites. Coast Douglas-fir is a dominant seral species on warmer aspects, and yellow cedar is a long-lived seral species on colder and wetter aspects. Forest productivities generally decrease with increase in elevation, as the growing season becomes shorter. Only a single subzone has been described for the Inner Coastal Region: the yellow cedar subzone.

Yellow cedar subzone

The yellow cedar subzone (CwH-aF:b) of the Coastal western hemlock - Pacific silver fir zone within the Quadra Section ranges from about 700 to 1100 m, along middle to upper slope positions in the Vancouver Island Ranges physiographic unit. Dominant precipitation is in the form of rain, with growing season precipitation (May to September) ranging from about 250 to 350 mm. After evapotranspiration losses, a small climatic moisture deficit of 50 mm to a surplus of at least 150 mm may occur. Climatic data are insufficient in parts of the study area to be mapped accurately, so the wetter extremes are not well defined. There is a strong increase in the precipitation as one moves westward towards the Inner Coastal -Outer Coastal Region boundary. The freeze-free period is much shorter than in lower areas, being reduced to 100 to 140

days. Winters tend to be cold, with significant accumulations of snow. The subzone has been delineated on deer habitat maps within an area with accumulated snow on April 1 exceeding 60 cm (Stordeur 1981). The longevity of snow is probably the dominant climatic factor determining this subzone.

On deeper soils, soil moisture is probably not a limiting factor to growth during most summers. Forest floor material is shallow to deep, and soil organic matter is deeper than at lower elevations. Soils tend to be strongly leached and quite acidic. Some drier areas are disturbed by fire, but it appears to be an uncommon event within the subzone. Logging is becoming increasingly common in lower parts of the subzone, and access is improving. However, steep topography and unstable colluvial materials limit land use activities in many areas. Forest productivities are generally medium, with the best sites receiving additional moisture and nutrients from seepage. Colluvial and morainal deposits are the dominant surficial materials.

Though this subzone is named the same in both Inner and Outer Coastal Regions, there are some differences in vegetation that reflect the lower precipitation in the Inner Coastal Region. Coast Douglas-fir is a common seral species in lower areas of the subzone in the Quadra Section. Yellow cedar is not as common, and understory species such as white-flowered rhododendron are not dominant. Drier species, such as American vanilla leaf and pipsissewas, may be common.

Major vegetation landscapes are differentiated primarily on the basis of depth of material and moisture regimes. Because forest growth on the acidic soils is strongly associated with the forest floor accumulated organic matter, underlying differences in such factors as bedrock type and soil development are less significant than at lower elevations.

Many sites are presently covered with climax vegetation, with logging and fire being the major sources of disturbance leading to successional forests. The climatic climax is a forest dominated by Pacific silver fir and western

hemlock, with regenerating conifers dominating the understory. Blueberries (both oval-leaved and Alaskan) may also be common, with red huckleberry. A very dense coniferous canopy intercepts so much light that understories are often of low cover, except for a dense moss layer. Parent material is either a morainal or colluvial blanket, lacking seepage through much of the growing season. On warmer aspects and lower elevations, disturbances may result in coast Douglas-fir occurring as a seral species. Once established, this species longevity will result in a delay of several hundred years in returning to a true climatic climax. On cooler aspects and higher elevations, western hemlock and Pacific silver fir will probably regenerate immediately after logging, especially when no slash burning occurs.

Drier-than-average sites will have a more open western hemlock - Pacific silver fir forest, with a dense shrub understory. Western hemlock will probably be more common, and forest productivity will be much lower. The shrub layer includes blueberries, rusty Pacific menziesia, and possibly stunted salal. A dense moss layer is present. As with the climatic climax sites, most tree rooting and nutrient uptake occurs in the accumulated forest floor material; destruction of this by fire would lead to a long delay in natural coniferous regeneration, though this may favour coast Douglas-fir at lower elevations.

Moister-than-average sites support a vegetation landscape that has a component of yellow cedar mixed with the western hemlock and Pacific silver fir. Seepage addition must be continued for most of the growing season in order to overcome the tendency towards moisture deficits. Good tree productivity results in an extremely dense overstory, usually with Pacific silver fir being the major understory regenerating species, with a sparse cover of blueberries and a dense carpet of moss.

Non forested sites are not common in this subzone. On extremely steep slopes in some of the smaller river valleys, some snow avalanching does occur - these sites are unable to support trees. They are sometimes covered in low, dense alder thickets.

3.3.1.3 Subalpine mountain hemlock - Pacific silver fir zone

The Subalpine mountain hemlock - Pacific silver fir zone (SA mH-aF) of the Quadra Section ranges in elevation from about 1000 to 1800 m. The lower portion of the zone intergrades into the Coastal western hemlock - Pacific silver fir zone or the Coastal western hemlock zone. The upper limits of this subalpine zone are either the height of land, exposed bedrock with insufficient soils to support tree growth, or the Alpine tundra zone. As in the Outer Coastal Region, site conditions such as bedrock exposure generally become limiting to tree establishment and survival before macroclimatic influences exclude trees. The upper boundary of this zone is defined on the upper potential elevation capable of supporting trees, whether these be full size or krummholz forms. Because of the frequency of bedrock at this upper limit, mapping the upper extent of the Subalpine mountain hemlock - Pacific silver fir zone was not attempted (see Volume 3).

The two major macroclimatic processes influencing this forest zone are moist air that was orographically uplifted to the west and the interrelated cooling of this air associated with increasing elevation. These processes result in a short growing season and snow is a dominant form of precipitation. Because much of the moisture has already been released in the Outer Coastal Region during the uplifting of Pacific air, the subalpine in the Inner Coastal Region is climatically drier. This is especially evident from shallow sites that may suffer moisture deficits during the growing season. Growing season precipitation is in the range of 275 to greater than 400 mm. Climatic mapping often indicates insufficient data for this zone in much of the study area (Coligado 1982a). However, freeze-free periods are less than 120 days and may be as short as 60 days. A climatic moisture surplus is usually present, though evapotranspiration losses and May to September precipitation may approach a moisture deficit.

The Subalpine mountain hemlock - Pacific silver fir zone is characterized by a climatic climax forest of mountain hemlock and Pacific silver fir on deep

moderately well to well drained sites. Both tree species are tolerant of deep, wet coastal snow conditions and a short growing season. This zone within the Inner Coastal Region is very similar to the subalpine zone within the Outer Coastal Region. In fact, the zone is often continuous across the boundary where the two regions meet; the boundary is often the height of land separating the leeward from windward areas. Within the Inner Coastal Region, the subalpine zone becomes drier as one approaches the eastern most heights of land. Total snowfall will be less, but few vegetative features reflect any major climatic change. Forest cover is not continuous throughout the zone. At higher elevations, tree distribution tends to become clumped and patchy, and often the growth form reflects the more adverse environment by becoming stunted and bushy. On the basis of this change in growth form and structure, this forest has been subdivided into two subzones: the forested subzone and the parkland subzone. Because of problems with mapping scale and a dominant inclusion of bedrock in many upper subalpine areas, these subzones were complexed on the forest zonation maps (see Volume 3).

Forested Subzone

The forested subzone (SA mH-aF:a) of the Subalpine mountain hemlock-Pacific silver fir ranges in elevation from about 1000 to 1500 meters, though the upper limit is variable due to differences in general topography and climate. Besides having continuous forest cover, this subzone is characterized by some forest understory species such as oval-leaved blueberry and white-flowered rhododendron. Both these species are more common here than in the subalpine of the Outer Coastal region. Western hemlock may be present as a codominant with mountain hemlock in lower elevation stands. Coast Douglas-fir is also found as a seral species on some lower, drier aspects, especially in areas where the subalpine zone abuts directly with the Coastal western hemlock zone rather than the Coastal western hemlock-Pacific silver fir zone. Alpine fir is fairly common in this subzone, especially on colder sites, as with pockets receiving cold air pooling. For mapping purposes, the lower limit of the forested subzone is determined by the higher proportion of mountain hemlock

over western hemlock in forested stands. Major differentiation of vegetation landscapes is a function of soil depth and presence of additional moisture supplies.

On deeper surficial materials, a mixed forest of mountain hemlock and Pacific silver fir occurs, with a shrub-dominated understory of oval-leaved blueberry and white-flowered rhododendron. Coniferous regeneration is usually common, dominated by Pacific silver fir. The herb layer is sparse, with five-leaved creeping raspberry, Canadian bunchberry, and twayblades. The moss layer is usually dense. Mountain hemlock regeneration is only scattered, usually restricted to fallen logs and thick forest floor organic material. Deep snow and a short growing season result in low forest productivity. As underlying mineral soils are heavily leached (podzolic), most of the nutrients for forest growth are found in the forest floor material. Disturbed sites generally succeed directly back to climax species, often with formerly suppressed coniferous regeneration quickly becoming dominant. Sites are initially shrub-dominated, unless burning has removed competition that will then allow invasion by pioneering herbs, primarily fireweed.

On similar sites in the lower part of the subzone, western hemlock may be mixed with the Pacific silver fir and mountain hemlock. On these sites, western hemlock regeneration is often common. No other major vegetation differences occur.

Sites with a major seepage component support better tree growth. Yellow cedar is common as a long-lived seral species on these sites, and mountain hemlock is less common. Understories, though shrub dominated, often have openings in wetter runnels, usually indicated by a richer herbaceous component dominated by green false hellebore. These sites are not as common in the Inner Coastal Region as they are in the Outer Coastal Region, due to lower precipitation.

Shallow to bedrock sites, usually associated with upper slope to apex positions, support the least productive forests. Mountain hemlock tends to

predominate; this may be related to its ability to grow on sites with less favorable nutrient supplies than are required by Pacific silver fir. The accumulated forest floor material provides the major nutrient supply to the vegetation. Understories are shrub dominated, with patches of shrubs often growing on the sites too shallow to support a continuous forest.

Wet, collecting areas or slopes with continual surface seepage may be unable to support tree growth. Soils develop a "turfy top" from the heavy cover of grasses and sedges. When open water is present, a rich diversity of herbaceous plants may occur, including rein orchids, green false hellebore, *leptarrhena*, and *dodecatheons*.

Parkland Subzone

The parkland subzone (SA mH-aF:b) of the Subalpine mountain hemlock - Pacific silver fir zone may occur above about 1400 meters. Local differences in climate and topography can make the lower limit very variable. The upper elevational limit, if suitable surficial materials are present, is about 1800 meters. However, bedrock is commonly encountered at a lower elevation, so tree cover is excluded by edaphic rather than climatic reasons. The parkland subzone is characterized by a predominance of mountain hemlock, usually stunted in growth, and a discontinuous forest cover. Nonforested areas either are too wet or too dry for supporting trees. Tree establishment is restricted to areas where the snow-free period is longer than average. These tree clumps usually have lower branches modified and flattened by extensive wet snow cover. Snow loads also result in frequent broken tops. Dominant shrubs associated with these clumps are white-flowered rhododendron, black blueberry, and rusty Pacific *menziesia*. Extensive drier areas between the tree clumps are dominated by species such as red mountain-heather, Merten's cassiope, crowberry, and *luetkea*. These species in turn tend to give the soil a "turfy top", which in conjunction with inadequate moisture holding capacity, preclude tree establishment. Sheltered basins, where snow melt is delayed, support a dominance of moisture requiring species, such as Sitka valerian, marsh marigold, green false

hellebore and leptarrhena. The areas of slowest snow melt, as in nivation hollows, are usually dominated by black alpine sedge. All these species are associated with ponded areas or slow moving, high order streams.

As in the Nootka Section, the distribution of snow, time of snow melt, and depth of surficial materials are the dominant factors governing plant distribution in this subzone. Revegetation would be very slow after disturbance. Climatic data are generally lacking for this subzone, however, it is thought that not all years would be suitable for tree establishment, even on suitable sites.

3.3.1.4 Alpine Tundra Zone

The Alpine tundra zone (At) of the Inner Coastal Region is generally found above 1800 m. This zone is limited to a few taller mountains, specifically associated with the central Vancouver Island Ranges. The climate is too severe for the establishment of trees, even in a krummholz growth form. The dominant precipitation form is snow, however, the lack of climatic data from this zone makes any exact description of the climate impossible. Recent glaciation, followed by active postglacial processes, have removed most surficial material. Bedrock predominates, and any vegetated sites are usually scattered and discontinuous. Plants found in pockets of deeper material include red mountain-heather, Merten's cassiope, saxifrages, and lichens. No attempt was made to map this zone; it was complexed with the Subalpine mountain hemlock - Pacific silver fir zone (see Volume 3).

3.3.2 Malahat Section

The Malahat Section of the Inner Coastal Region is restricted in geographical extent on Vancouver Island to the southeastern coast (Figure 3), along the Nanaimo Lowlands, from Nanaimo south to Sooke (Holland 1976). The dominant macroclimatic process is coastal rainshadow, with descending and drying Pacific air (Marsh 1983). This section is within the rainshadow of both the Vancouver

Island and the Olympic Mountains. Net radiation values are highest here for Vancouver Island, and soil moisture deficits are common. This forest section is characterized by a low elevation climatic climax forest of grand fir and western red cedar, changing to a western hemlock climax at mid elevation inland and occasionally a higher elevation subalpine climatic climax of mountain hemlock, with Pacific silver fir. A narrow belt of western hemlock and Pacific silver fir may be present below the subalpine zone. Coast Douglas-fir is the dominant seral tree for much of this section; mature old-growth forests are rare because of intensive disturbances over much of the area. The dryness of this section is also exemplified by the presence of Pacific madrone and Garry oak on shallow to bedrock sites and by the absence of Sitka spruce. Disturbed sites usually regenerate to long-lived deciduous or coniferous seral species; climatic climax species usually regenerate only under a closed forest canopy established by the more aggressive seral species.

3.3.2.1 Coastal Grand Fir - Western Red Cedar Zone

The Coastal grand fir - western red cedar zone (CgF-wC) is the characteristic zone of the Malahat Section of the Inner Coastal Region. It ranges in elevation from sea level to only about 300 m. The zone is restricted to a narrow strip along the southeast and south coast of Vancouver Island, and includes the Victoria area and Saanich Peninsula. The northern most extent occurs on the Nanaimo Lowlands south of Nanaimo, and stretches south around the Island to Sooke Basin. The zone is in the lee of both the Vancouver Island Ranges and the Olympic Mountains so that the dominant macroclimatic process is coastal rainshadow (Marsh 1983). Net radiation is high, growing season precipitation is low, and in combination, these factors result in extensive moisture deficits (150 to 250 mm). A sharp increase in moisture deficit and freeze-free period is encountered in the Victoria area. The average freeze-free period for the zone is about 160 to 220 days (Coligado 1982b). Growing season precipitation is the lowest for the project area (less than 150 to 200 mm). Almost all precipitation falls as rain, with little accumulation of snow. In combination, these climatic parameters result in a mild, dry environment,

where disturbances by fire were once common. Older forests are almost non-existent because of both fire history and intensive land use activities. Much of the end results to the various successional patterns are extrapolated from known ecological characteristics of the tree species.

The Coastal grand fir - western red cedar zone is characterized by a climatic climax forest of grand fir and western red cedar on deep, well drained sites. In response to frequent disturbance, coast Douglas-fir is the predominant seral species on deeper sites. Broad-leaved tree species are also common. Based on only limited field data and existing vegetation publications (e.g. Roemer 1972; Packee 1974; Krajina 1969), only a single subzone has been recognized - the Pacific madrone subzone.

Vegetation landscapes are strongly differentiated on the basis of available soil moisture and the related depth of surficial material. On deep, well-drained materials, a climatic climax forested vegetation landscape, dominated by western red cedar and grand fir, is expected. This landscape proceeds through a set of long-lived successional stages. Coast Douglas-fir is usually the dominant seral species. Young seral forests have dense shrub understories, dominated by salal and dull Oregon-grape. As succession progresses, the dense closed tree canopy slowly eliminates available light, and the understory opens. Grand fir and western red cedar are rare to common regenerating species. Both are sufficiently shade tolerant to grow under a closed canopy. Roemer (1972) expected that "it would take several generations of Abies grandis [grand fir] before this tree would replace the long-lived Pseudotsuga [coast Douglas-fir]". He also feels that coast Douglas-fir is not shade tolerant on mesic sites and therefore does not form the climatic climax. In maturing to overmaturing seral stages, openings from falling trees again allow better light penetration, and herbaceous species become more common. In much of the zone at present, dense regeneration of both grand fir and western red cedar is observable; it is postulated that it will take several centuries, in the absence of fire, for the forests to reach their theoretical climax.

On moister-than-average sites, this successional replacement by western red cedar and grand fir is further advanced in the vegetation landscapes, which are again presently dominated by coast Douglas-fir. The understories have a stronger herbaceous component, usually with western sword fern and foamflowers, although salal and dull Oregon-grape may still be present. Bigleaf maple is a frequent occupant of these sites. It is more shade tolerant than coast Douglas-fir (Roemer 1972); whether it should be considered a seral species or a climax species is in doubt. Indian-plum is a common shrub in this landscape, especially on wetter sites. Red alder may also be associated with the grand fir and western red cedar.

On drier-than-average sites is a vegetation landscape dominated by a mixture of coast Douglas-fir, western flowering dogwood and Pacific madrone. Oceanspray dominates the shrub layer, often with dull Oregon-grape and baldhip rose. This landscape occurs primarily on steep slopes with rock outcrops. This results in an open and often irregular tree canopy, with nonforested openings on the most shallow sites. Fire in this landscape leads to dense regeneration of the Pacific madrone, almost to the exclusion of coniferous regeneration. This landscape may have a wide diversity of herbaceous species, that may include grasses, licorice fern, white fawn lily, yerba buena, and hairy honeysuckle. Many of these plants are spring flowering, so seed formation is complete before moisture deficits become critical.

On the driest rock-outcrop and shallow colluvial veneer sites are open deciduous vegetation landscapes, dominated by Garry oak. Understory composition is quite variable in this landscape, though a shrub layer with oceanspray and common snowberry is a dominant feature. Licorice fern often forms dense mats on the bedrock, whereas the deeper soil pockets support a variety of grasses and spring wildflowers, such as white fawn lily, common camas, death-camas, and Henderson's shootingstar. Garry oak is usually rooting in pockets of surficial material; it has a scrubby form and possibly intergrades into a mixture with coast Douglas-fir on slightly moister sites. On this landscape, summer moisture deficits are a dominant factor controlling vegetative growth.

Garry oak is also a characteristic species in a vegetation landscape restricted to the southern portion of the Saanich Peninsula, on deep, gently sloping soils. This landscape is described by Roemer (1972), who refers to the plant community as the Quercus - Geranium community (oak - geranium).

3.3.2.2 Coastal Western Hemlock Zone

The Coastal western hemlock zone (CwH) in the Malahat Section forms a continuous band along the western boundary of the Coastal grand fir - western red cedar zone. In most of this area, it occurs in an elevational range of from 150 m (or even sea level) to about 850 m. This area includes the western portion of the Nanaimo Lowlands and the lower slopes of the Vancouver Island Ranges. Climatic parameters are similar to those described for this zone in the Quadra Section (see 3.3.1.1). May to September precipitation is in the range of 175 to 300 mm, with a moderately long freeze-free period (140 to 180 days). Climatic moisture deficits are the major limitation to vegetative productivity and range from 50 to 200 mm. Both the coast Douglas-fir and western hemlock subzones are present in the Malahat Section. Climax communities have been extensively removed by fire and logging, with some agricultural/residential development on the coastal plain. Forest productivities may be medium to very high, improving with an increase in precipitation westwards. No significant vegetative differences exist between this forest zone in the Malahat Section or in the Quadra Section.

3.3.2.3 Coastal Western Hemlock - Pacific Silver fir Zone

The Coastal western hemlock - Pacific silver fir zone (CwH-aF) in the Malahat Section is very limited in distribution, occupying a few upper slope positions in close proximity to the Quadra Section. Climatic data is sparse; however, little difference was found with this zone in the Quadra Section (see 3.3.1.2), with moisture deficits at about 0 mm and a freeze-free period of 100 to 130 days. This zone would tend to include the drier vegetation landscapes described for the zone in the Quadra Section, with coast Douglas-fir being

common in successional forests. This zone is fragmented, and often impossible to map in the transition area from the Coastal western hemlock zone to the Subalpine mountain hemlock - Pacific silver fir zone (see Volume 3). Frequent past disturbances by fire and logging have also contributed to a confusing pattern of successional vegetation - the common practice of planting coast Douglas-fir tends to create mapping difficulties. As in the Quadra Section, only the yellow cedar subzone exists in this Section.

3.3.2.4 Subalpine Mountain Hemlock - Pacific Silver Fir Zone

The Subalpine mountain hemlock - Pacific silver fir zone (SA mH-aF) is restricted to a few apex slope positions north of Cowichan Lake near the Quadra - Malahat Section boundaries. Climatic parameters are similar to those described for the Quadra Section (see 3.3.1.3), with little or no climatic moisture deficit and a short freeze-free period of about 80 days or less. Vegetative productivity would be low. Western hemlock is frequently found mixed with the mountain hemlock, and even some seral coast Douglas-fir may be present in the lower portion. Seepage rich sites are uncommon because precipitation is at the dry end of the range for the subalpine areas, so the drier-than-average vegetation landscapes predominate. No major vegetative distinction can be made between the two Sections in the Inner Coastal Region. Descriptions of the major vegetation landscapes are found in 3.3.1.3. Only the forested subzone is found in the Malahat Section.

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Volume

2



Ministry of Environment

MOE Technical Report 27

**VEGETATION RESOURCES
OF
VANCOUVER ISLAND
VOLUME 2. VEGETATION TYPES**

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WILDLIFE BRANCH

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PREFACE

This report, Vegetation Resources of Vancouver Island, is another contribution to the vegetation inventory of British Columbia. Since 1968, the mapping and data collection of vegetation has been an ongoing program of the Vegetation Unit of the Terrestrial Studies Section, Surveys and Resource Mapping Branch¹. Vegetation is classified and described within the biophysical system (Walmsley and van Barneveld, 1976). Forest regions, sections, zones, and subzones are described and mapped (1:100 000). Vegetation types are classified, described, and linked to soil classes and other environmental variables.

This project is designed to provide organized vegetation and ecological information for future work in developing interpretations for a wide variety of resource uses, including wildlife habitats, recreation, and land use planning.

This report is one of a series of Environment technical reports that describe, map, and analyse the biophysical resources of the Vancouver Island area.

¹Organizational changes in 1984 to the Surveys and Resource Mapping Branch has caused a split in the Vegetation Unit. Vegetation personnel are now assigned to other branches within the Ministry of Environment. The senior author of this report now reports to the Wildlife Branch.



ABSTRACT

This report, Vegetation Resources of Vancouver Island, and the accompanying forest zonation maps are the product of the vegetation survey of the Vancouver Island mapsheets. Together, they provide basic information about the classification, distribution, and ecology of the vegetation and its related properties.

Fieldwork for the survey was carried out during 1973-1975. Data south of the 49°N latitude was collected under the supervision of Dr. E. Oswald of the Canadian Forestry Service, Victoria; data north of the 49°N latitude was collected by Terrestrial Studies Branch vegetation personnel.

The report is contained in three volumes. Volume 1 deals with descriptions of the regional vegetation, within the biophysical forest zonation classification. Two forest regions, four forest sections, eleven forest zones, and ten forest subzones, including both the environmental and ecological characteristics and major successional sequences found within each forest subzone are described. Volume 2 contains descriptions of the one hundred and six vegetation types classified for Vancouver Island, and includes a dendrogram showing hierarchical relationships between the types and a vegetation-soils table showing the relationships of vegetation types to soil association components described by Jungen (1982) and Chatterton and Senyk (1981).

The areal distribution of forest regions, zones, and subzones are shown on the forest zonation maps (1:100 000) contained in Volume 3.

ACKNOWLEDGEMENTS

This report was produced with the assistance of many people. Some members of the Vegetation Unit and the Canadian Forestry Service, and many seasonal employees, were involved in field sampling and gave advice in reporting.

John Jungen gave valuable advice for correlation with soils and Mauro Coligado was extremely helpful with providing preliminary climatic information.

Editorial advice was provided by Jim van Barneveld, Ed Oswald, and Ted Lea. Special appreciation goes to Barbara Webb for her typing efforts.

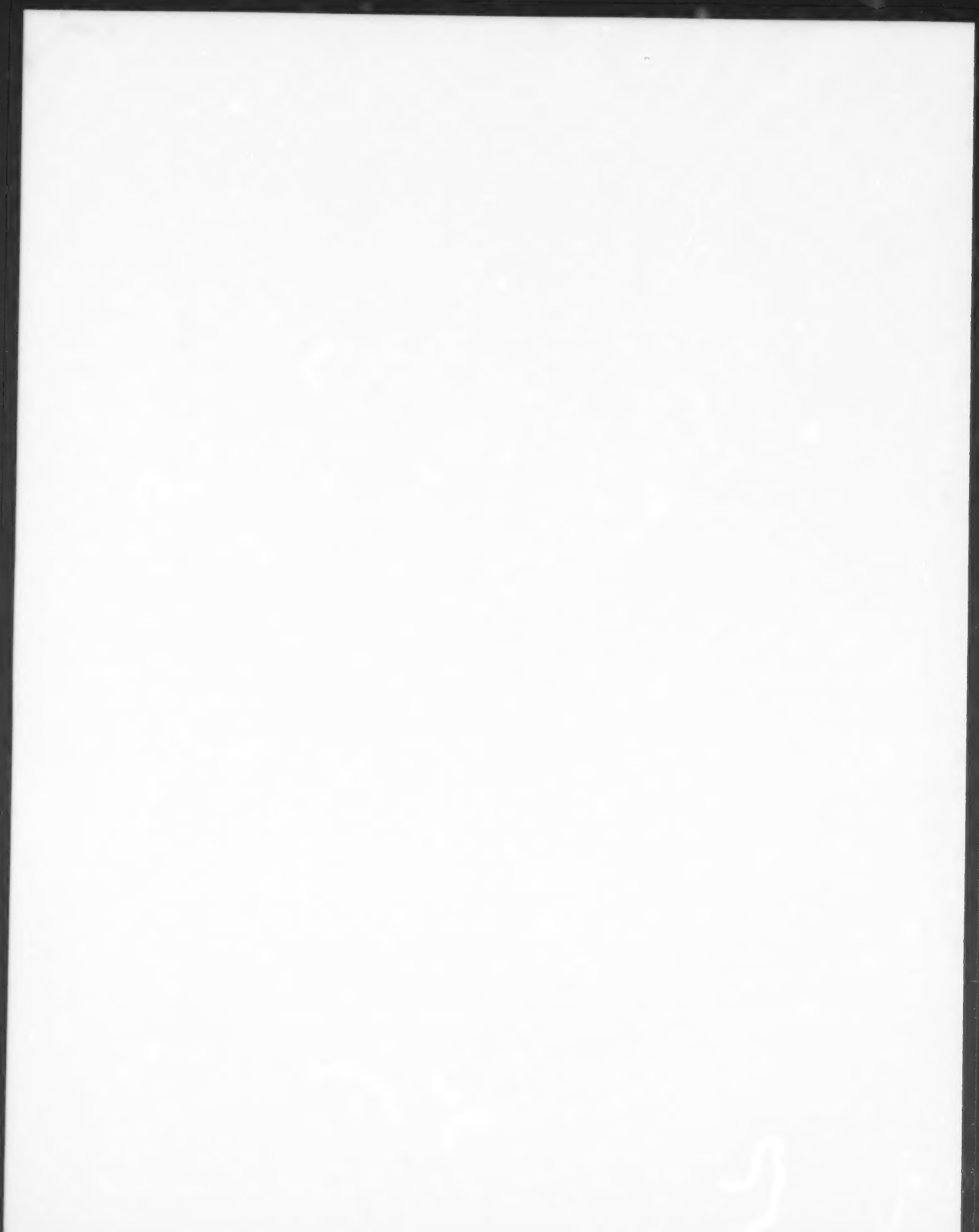


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CHAPTER ONE VEGETATION TYPES

1.1 INTRODUCTION

This volume of the report describes the floristic and associated physical attributes of one hundred and six vegetation types classified for Vancouver Island, based on 885 vegetation samples. This classification is based on methods described in Section 1.4 of Volume 1. Two kinds of vegetation types were determined: types represented by at least two field sample plots and given a formal type name, and types represented by only a single field sample and not named. The latter are referred to by their plot number (eg. SR740102); a more formal designation was not used because one plot was not considered to be an adequate representation of a type. These single releve's (SR) are usually samples of unusual vegetation types that are not very well sampled at a reconnaissance level of survey. Formal vegetation type names are a combination of dominant and characteristic species. Each vegetation type is assigned a number in the computerized process of classification. This is shown at the upper left of each type description linked to 010, the project number.

Figure 1 presents the dendrogram of the clustered vegetation types, showing the interrelated pathways among these types. The horizontal scale gives a relative index of similarity; that is, the farther to the right two types are joined, the stronger their similarity to each other. Page numbers indicate where in this volume the type description may be found.

Appendix A provides a glossary of terms used in the following vegetation type descriptions. When a vegetation type was sampled on a wide range of soils, the listing of soil association components may not be complete, with just the more common soils listed. A complete listing of these components can be derived from the soils - vegetation tables found in Chapter 2. A species listing linking botanical names to the common names used in the tables is

presented in Appendix B. A complete listing of all species used in the classification for any vegetation type can be derived from the constancy tables. These tables, found in Appendix C, give the frequency of each species for each plant layer in each vegetation type. Single relevés will have species constancies listed as 100 per cent. Under each vegetation type number listed across the top of the constancy tables is given the number of plots used to describe each type.

1.2 VEGETATION TYPE DESCRIPTIONS

The following section contains the descriptions for the one hundred and six vegetation types. They are ordered numerically; their hierarchical relationship is illustrated in Figure 1.

CHAPTER TWO

SOIL ASSOCIATION COMPONENT - VEGETATION TYPE TABLES

The primary purpose of the soil association component-vegetation type tables is to provide a link between soils, which have been mapped for the entire study area at a scale of 1:50 000, and the vegetation types described in Chapter 1. By using the soil maps in conjunction with other aids such as aerial photographs and forest cover maps, one can usually determine the possible range of vegetation types that may be occurring on a particular map area. All of the types have been assigned to the soils component from the field data; where data are lacking or sampling was sparse, types were not extrapolated to the soil association components because the soil legend is too complex for accurate assignments. It should be noted that the extrapolation could not fill in all data gaps - more intensive sampling for specific projects may add to these data. For a more detailed description of the soil associations and their components, see Jungen (in preparation) and Chatterton and Senyk (1980).

Several points should be noted about the soils-vegetation tables. If both the fifth and sixth component of a soil association are present in the soils legend, vegetation types have only been entered for the sixth component (sixth component has the major portion as a lithic soil). Except for types assigned to the first components, other types are related to the associated soil development. Entries on the soil legend are limited to those components actually mapped - vegetation samples may have occurred on unmapped components (ie. a sample may occur on a lithic colluvial soil that was always mapped as being nonlithic).

Much of the lower elevation areas in the Inner Coastal Region have been disturbed by fire, logging, and other clearing activities. Therefore, climax forest stands are rare, and data on climax types are sparse. In many of the higher elevation areas and in most of the Outer Coastal Region, disturbances

have been mostly confined to some logging, and data on successional types are limited. In some of the edaphic types, especially for wetlands, it has been assumed that they occur in climax form and no secondary succession trends have been described. The Alpine tundra zone, because of its limited extent, has no data for either soils or vegetation types. Because the relationship of seral or climax predominance is relatively consistent to the zone or subzone, no attempt has been made to separate vegetation types into seral or climax columns in Table 1.

Table 1

Soil - vegetation type legend for Vancouver Island

BIOPHYSICAL FOREST ZONE AND SUBZONE	SOIL PARENT MATERIAL (Surficial Material)	SOIL ASSOCIATION/COMPONENT ¹		VEGETATION TYPES ²
		NAME	MAP SYMBOL	
Coastal grand fir - western red cedar zone (CgF-Wc)	Colluvium: veneer ($<1m$)	Huffer Ragbark Spruce bark Tzuhalem	HF 6 RJ 1 RJ 6 SJ 6 TM 1 TM 6	50 45 45, 56, 41 64 45 45, 49, 68, 69
	Fluvial	Chemainus River Genoa Quamichan	CP 1 GA 1 QU 1 QU 3 QU 4	99 41, 45, 46 45, 49, 67, 46 41, 67 45, 50
	Marine	Finlayson Tagner	FF 1 FF 2 TT 1	50, 49, 45 50 45, 73, 96
	Morainial	Haslam Somenos	H1 H5 SE 1 SE 3 SE 5	41, 45, 49, 50 50 45, 49, 46, 50, 41, 68 49 41
	Organic	Azilian	AZ 7	94
Coastal western hemlock zone: coast Douglas-fir subzone (CwH:a)	Colluvium: veneer ($<1m$)	Hiller Robertson Rosewell Shepherd Squally	HL 2 HL 6 HL 7 RB 1 RB 6 RL 1 RL 3 RL 6 SP 1 SP 2 SP 6 SL 1 SL 6	52, 59, 57, 7 41, 45, 46, 64, 68, 69 46 46, 80 49, 41, 63, 69, 56, 82, 59, 68 41 46 41, 66, 69 56, 52 68 66 57 64, 56, 41, 70
	Colluvium: deep ($<1m$)	Cottam	CE 1 CE 2	64, 41 57
	Fluvial: deep	Cassidy Chemainus Hawarth	CA 1 CA 4 CA 7 CH 1 CH 4 CH 7 HA 1 HA 2 HA 3 HA 4 HA 7	67, 58 49, 82 87, 82 49, 82, 83 43 84 56, 45, 59, 82, 104 67, 48, 58, 57, 59 52 96 46, 56 46, 48, 67, 59

Table 1. (Continued)

BIOPHYSICAL FOREST ZONE AND SUBZONE	SOIL PARENT MATERIAL (Surficial Material)	SOIL ASSOCIATION/COMPONENT ¹		VEGETATION TYPES ²
		NAME	MAP SYMBOL	
Coastal western hemlock zone: coast Douglas-fir subzone (CwH:a) (continued)	Fluvial: deep (continued)	Kuhushan	KA 1	81, 52, 57
			KA 4	43
		Kye	KA 7	96
			KY 1	1, 56, 58, 17
		Qualicum	KY 2	52
			Q 1	45, 54, 67, 52.
				57, 58
			Q 3	41, 46, 84, 52, 90
			Q 4	58, 59, 57, 106
			Q 8	46, 56
				1
	Fluvial: veneer	Beavertail	BL 1	70, 42, 59
			B 1	50, 56, 86, 48, 54
		Bowser		43, 1, 59, 58, 96,
			B 2	88, 90, 93
			B 7	62
			D 1	84
			D 2	47, 86, 49, 59, 63
				56, 45, 57
			D 7	45, 47, 48, 70, 59
		Parksville	PA 1	57, 105
				47
	Marine	Alberni Fairbridge Tolmie	A 1	84, 96
			F 3	54, 50, 58, 41
			T 1	96, 89
			T 4	46, 90
	Morainal	Quinsam	QN 1	45, 48
			QN 2	47, 46, 22, 56,
			QN 4	80, 57
			RA 1	46, 45
		Ronald	RA 2	63
			R 1	50, 86, 59, 54
		Royston	R 2	49, 47
			S 1	47, 57
		Shawnigan	S 2	57
			S 3	49, 54, 46, 96,
			S 5	82, 70, 57, 59
			S 4	46
	Organic	Arrowsmith	AR 1	49, 45, 22, 88, 56
			AR 7	70
Coastal western hemlock zone: western hemlock subzone (CwH:b)	Colluvium: veneer (<1m)	Healey Hemmingsen	HE 1	41, 46
			HG 1	54
		Piggott Rossiter	HG 6	4
			PT 6	5
			RT 1	66, 63
			RT 2	1, 48, 20, 76, 63,
			RT 6	50, 56, 25, 64, 79
				68
				5, 54, 20, 23, 22,
				66, 41, 42, 68, 56
				63, 64, 1, 66

Table 1. (Continued)

BIOPHYSICAL FOREST ZONE AND SUBZONE	SOIL PARENT MATERIAL (Surficial Material)	SOIL ASSOCIATION/COMPONENT ¹		VEGETATION TYPES ²
		NAME	MAP SYMBOL	
Coastal western hemlock zone: western hemlock subzone (CwH:b) (continued)	Colluvium: veneer (<1m) (continued)	Strata	ST 1 ST 6	1, 76, 63, 20 64, 22, 18, 1, 42, 63
		Council	CL 8	20, 80
	Colluvium: deep (>1m)	Cullite	CT 1 CT 2 CT 3	5, 59, 56, 80, 97 76 54
		Fluvial	Effingham Errington Honeymoon	EH 7 EA 1 EA 7 HM 1
			HM 2	52, 1 46 84 4, 51, 48, 80, 87 78, 56, 74, 82, 96, 58, 93, 25, 61, 52, 2, 20, 63 33, 25, 57, 47, 11 41, 70, 59, 81, 22, 89 43, 87 1, 48, 52 96, 83, 85 89, 49, 68, 1 87 87, 75 96 56, 90, 5 1 96 103 87
		Kammat	KT 1 KT 2 KT 7 KT 8	
		Kinkade	KE 1 KE 4 KE 7	
		Sayward	SY 2 SY 7	
	Marine	Memekay	ME 1	1
	Morainial	Granite	GT 1	20, 23, 76, 22, 92, 4, 1
		Quimper	QP 1	46, 1, 61, 80, 20, 54, 63, 56, 66, 25 52, 88, 76, 22, 68 12, 24 54, 61 45, 87 46, 47, 56, 20, 66 80, 74, 93, 25 93 48, 54, 20 41, 25
		Reegan	QP 2 QP 7 RN 1 RN 3 RN 4 RN 7	
	Organic	Aveline	AE 1	94, 34
Coastal western hemlock - Pacific silver fir zone: western red cedar subzone (CwH-aF:a)	Colluvium: veneer (<1m)	Hankin Hatzite Hecate Cove Hesquiat	HK 6 HT 1 HT 6 HV 1 HQ 1 HQ 6	32 6, 32, 33 1, 32 26 77 54, 65

Table 1. (Continued)

BIOPHYSICAL FOREST ZONE AND SUBZONE	SOIL PARENT MATERIAL (Surficial Material)	SOIL ASSOCIATION/COMPONENT ¹		VEGETATION TYPES ²
		NAME	MAP SYMBOL	
Coastal western hemlock - Pacific silver fir zone: western red cedar subzone (CWH-aF:a) (continued)	Colluvium: veneer ($<1m$) (continued)	Reeses	RS 1	9, 10
			RS 2	5, 4, 2, 77
			RS 3	6
			RS 6	1, 12, 64, 9
			RS 7	20
		Rutley Shelbert Sprise	RY 1	77, 33, 12
			SB 1	12, 10
			SS 1	2, 3, 6
			SS 4	5, 1
			SS 6	9, 98
	Colluvium: deep ($>1m$)	Calmus Cotter	CS 1	3, 4, 12
			CR 1	101, 3
	Fluvial	Conuma	CR 2	1, 100
			CU 1	10, 102, 1
			CU 3	8, 10, 102, 96
		Cluxewe	CX 2	102, 96, 9
			HH 1	73, 102, 81
			HO 1	1, 10, 92
		Holford	HO 2	96, 52, 10, 12
			HO 3	51, 1, 6, 10, 12,
				102, 96
		Hooper	HO 4	3
			HO 7	3
			HO 8	8, 5, 53
			HP 1	9, 6, 4, 10, 5
			HP 2	9, 10, 101, 2
		Nootka	HP 3	96, 93
			HP 4	10
			HP 8	77, 78
			NT 1	5, 10, 101, 96,
	Morainal	Snuggery	NT 7	32
				95, 89, 72, 81
		Sugsaw	SG 7	89, 102,
			SG 8	12, 2
		Ucluelet	SW 8	33
			SW 9	73
		Vargas	UC 1	78, 95
			UC 4	8, 78
			V 1	9, 32, 96, 34, 10
			V 2	9, 34
	Marine	Kennedy Lake	V 4	101
			KL 1	84, 95
			KL 3	77
		Kootowis Tofino	KL 4	89
			KO 1	77, 4, 101, 9, 102
			TO 1	32, 34, 73
	Morainal	Goldstream	GL 1	9, 33, 27
			HR 1	9, 10
		Hoarder Quatsino	QS 1	12
			QS 3	1, 51, 76, 1
		Ronning Rosander	RG 1	33
			RR 1	98
			RR 1	5

Table 1. (Continued)

BIOPHYSICAL FOREST ZONE AND SUBZONE	SOIL PARENT MATERIAL (Surficial Material)	SOIL ASSOCIATION/COMPONENT ¹		VEGETATION TYPES ²
		NAME	MAP SYMBOL	
Coastal western hemlock - Pacific silver fir zone: western red cedar subzone (CwH-aF:a) (continued)	Morainal (continued)	Sarita	SR 1 SR 2 SR 3 SR 4 SR 7 WL 1 WL 2	6, 1, 3, 12, 32, 77, 33, 4, 10, 5 98, 3, 10, 12 8, 34, 32 27 10 10, 12 10
	Organic	Alice Lake Amphitrite	AL AL 6 AT 1 AT 2	34, 33, 36 34 33, 34, 19, 40 34
Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone (CwH-aF:b)	Colluvium: veneer (<1m)	Lemmens	LI 1 LI 6 LI 1 LI 3 LI 6 NI 1	12 26 10 9 12 25, 23, 63, 21, 76
		Lemmens Inlet	LI 6 NI 2 NI 3 NI 6	12 28 28 63, 76, 78, 18, 15
		Nitinat	RI 1 RI 2 RI 3 RI 6	12 28, 15, 25, 98, 27 12, 76, 78, 23, 15 21, 63, 18, 26, 37 15
		Rainier	SI 1 SI 2 SI 6	16, 12, 6, 25, 26, 18 15 20, 27
		Shirmish	ZI 1 ZI 6	26, 15, 18, 54 26 26
		Zebrio		
	Colluvium: deep (<1m)	Crespi	CI 1 CI 2 CI 5 KI 1	98, 16 15 15 76, 21, 77, 78
	Fluvial	Espinosa	EI 1 EI 2 EI 3 EI 4 EI 8 HI 1	28 1, 25, 26, 60 12 80 96, 12 12
	Morainal	Fleetfoot	FI 1 FI 3 GI 1 GI 2	26, 28, 23 28 12, 15, 98, 16, 27 78, 15, 12, 16, 26
		Grilse		

Table 1 (Continued)

BIOPHYSICAL FOREST ZONE AND SUBZONE	SOIL PARENT MATERIAL (Surficial Material)	SOIL ASSOCIATION/COMPONENT ¹		VEGETATION TYPES ²
		NAME	MAP SYMBOL	
Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone (CwH-aF:b) (continued)	Morainal (continued)	Moyeha	MI 1 MI 6 MI 5	15, 28, 23, 63, 12, 55 15 21
		Quibble	QI 1 QI 2 QI 3	6, 27, 28, 18, 25, 15, 12 76, 78 15
	Organic	Artlish	AI 1 AI 4	39 39, 38
Coastal western hemlock - western red cedar zone (CwH-wC)	Morainal	Rannell Creek	RK 1	33, 36
	Fluvial	Dillon Rock	DK 1	27
	Marine	Vargas	V 1 V 2 V 4	9, 32, 96, 34, 10 9, 34 101
	Organic	Apple Creek Flat Rock	AK 1 AK 5 FK 1	36 36 36
Subalpine mountain hemlock - Pacific silver fir zone (SAH-aF)	Colluvium: veneer (<1m)	Leighton Mountain	LH 6	15
		Reginald	RE 1 RE 3 RE 6	56, 29 15 35, 13
		Ritherton	RH 1 RH 6	14 14, 15, 13
		Smokehouse	SH 6	15
	Colluvium: deep (>1m)	Catface	CC 1	13
		Chetwood	CW 1	30, 31
	Morainal	Green Mountain	GN 1 GN 3	13 13
		Shofield	SO 1 SO 2 SO 3 SO 5	15, 14, 39, 13 15 15, 39 14
		Stockett	SC 1 SC 3	14 15
		Whiltilla	WH 5	14
	Organic	Ahousat	AS 1	39, 15, 13

¹Full descriptions of the soil associations and their components are in either Jungen (in preparation) or Chatterton and Senyk (1980).

²Vegetation types were not divided into seral and climax types because this division is fairly consistent with the subzone and zone (see text).

VANCOUVER ISLAND ANALYSIS

CLUSTERING OF OUTCOMES

MEAN SIMILARITY COEFFICIENT

WEIGHTED PAIR-WISDOM CLUSTERING

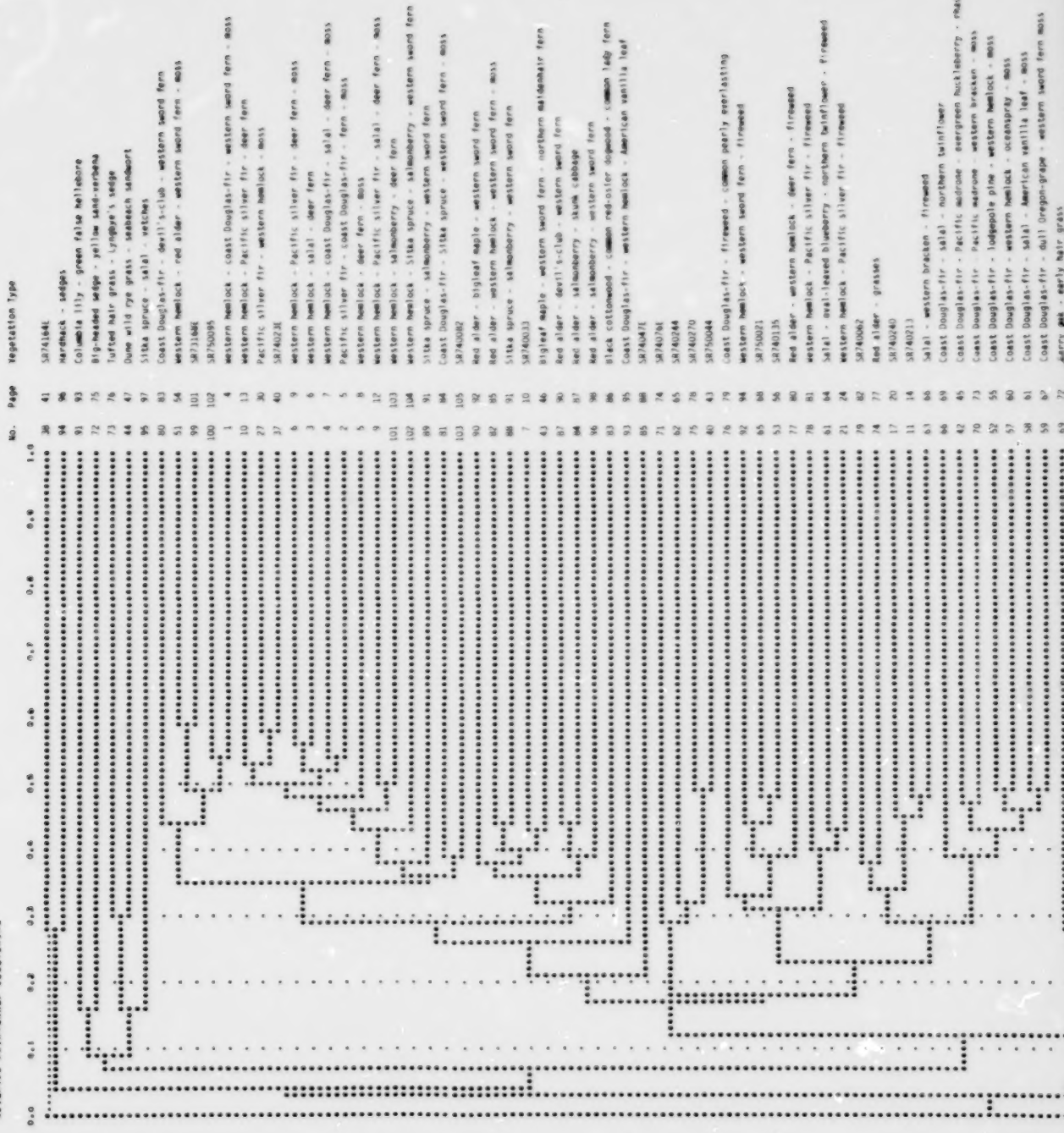


Figure 1. Clustering dendrogram of Vancouver Island vegetation types.

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NOTES: 1. SUSCEPTIBILITY OF ROTATION IS INDICATED BY CHARACTER "R" AT THE RIGHT OF ROTATION NUMBER. 2. ROTATIONS POSSIBLE IS NOTED TO RIGHT OF ROTABLE BRANCHES.

010-01	Western hemlock - coast Douglas-fir - western sword fern - moss
--------	---

VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: young to overmature seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (80)	western hemlock coast Douglas-fir	60-80 10		
Tall shrub layer (15)	western hemlock	10		
Low shrub layer (10)			red huckleberry western hemlock	<5 5
Herb layer (variable)	western sword fern	5-50	deer fern American vanilla leaf	5 <5
Moss, lichen and liverwort layer (15)	eurhynchium moss	10	plagiothecium moss	<5

CHARACTER SPECIES

Present	Absent
western hemlock coast Douglas-fir western sword fern plagiothecium moss	Pacific silver fir red alder

TERRAIN AND SOILS

Terrain: fluvial; colluvium; moraine; marine
 Soil Texture: coarse
 Soil Association comp: BL1,CR2,EH7,GT1,HM1,HO1,KT1,ME1,OL1,
 QP1,RS5,RT1,RY6,ST1
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0-600 m
 Slope: 0-60%
 Aspect: all
 Landscape position: normal, lower to upper slope

ECOLOGY

- very species-poor type, with dense tree canopy and very open, low-cover understory
- often referred to as a "nudum" type
- forest understory will become denser as forest matures and a diversity of age classes of tree species becomes dominant feature

010-02	Pacific silver fir - coast Douglas-fir - fern - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: overmature seral
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	western hemlock Pacific silver fir coast Douglas-fir	30-80 10 15	western red cedar	20
Tall shrub layer (variable)	western hemlock	10-60	oval-leaved blueberry Pacific silver fir	5 <5
Low shrub layer (15)	western hemlock red huckleberry	5 5	Pacific silver fir	<5
Herb layer (variable)	deer fern western sword fern	5-40 5-30	American vanilla leaf	<5
Moss, lichen and liverwort layer (variable)	eurhynchium moss plagiothecium moss	20 10	rhytidadelphus loreus moss	10

CHARACTER SPECIES

Present	Absent
Pacific silver fir deer fern plagiothecium moss coast Douglas-fir	salal

TERRAIN AND SOILS

Terrain: moraine; colluvium; fluvial
 Soil Texture: medium
 Soil Association comp: HM1,H01,Q53,R52,S51
 Moisture regime: hygric to subhygric
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 150-600 m
 Slope: 0-30%
 Aspect: all
 Landscape position: receiving, lower to middle slope

ECOLOGY

- improved texture and moisture availability, compared to 010-01, results in good growth of Pacific silver fir
- coast Douglas-fir overmature and not regenerating
- tall tree canopy and open shrub understory results in productive herbaceous growth
- transition type between Inner and Outer Coastal Regions

010-04	Western hemlock - coast Douglas-fir - salal - deer fern - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal, Outer Coastal Section: Quadra, Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: overmature seral to maturing climatic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (85)	western hemlock coast Douglas-fir western red cedar	60 5 25	Pacific silver fir	10
Tall shrub layer (20)	western hemlock	15	western red cedar red huckleberry	5 5
Low shrub layer (70)	red huckleberry western hemlock salal	15 5 60		
Herb layer (variable)	deer fern	varies	western sword fern	<5
Moss, lichen and liverwort layer (30)	eurhynchium moss	10	plagiothecium moss rhytidiadelphus loreus moss	<5 <5

CHARACTER SPECIES

Present	Absent
deer fern coast Douglas-fir salal western hemlock	

TERRAIN AND SOILS

Terrain: colluvium; moraine; fluvial
 Soil Texture: medium
 Soil Association comp: CS1,GT1,HG1,HM1,HP1,KO1,RS1,SR1
 Moisture regime: subhygric to mesic
 Drainage: well

TOPOGRAPHY

ECOLOGY

- could be subdivided on presence or absence of Pacific silver fir
- shrub layer dense, usually with species poor herb layer and dense moss layer on forest floor
- no obvious upslope enrichment, medium to high forest capability

010-05	Western hemlock - deer fern - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra, Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: young seral to maturing climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (85)	western hemlock	80	western red cedar	<5
Tall shrub layer (5)			western red cedar	<5
Low shrub layer (10)	red huckleberry western hemlock	5 <5	salal	<5
Herb layer (variable)	western sword fern deer fern	25 20		
Moss, lichen and liverwort layer (25)	plagiothecium moss eurhynchium moss	20 5		

CHARACTER SPECIES

Present	Absent
western hemlock deer fern western sword fern plagiothecium moss	Pacific silver fir coast Douglas-fir

TERRAIN AND SOILS

Terrain: colluvium; moraine, fluvial
 Soil Texture: coarse
 Soil Association comp: CT1,H08,NT1,RR2,RS2,RT5,SR1,SS4
 Moisture regime: mesic
 Drainage: well

TOPOGRAPHY

Elevation: 0 - 320 m
 Slope: 0 - 60%
 Aspect: all
 Landscape position: normal, lower to upper slope

ECOLOGY

- species - poor type, with extremely dense western hemlock allowing little light to penetrate to the understory
- would be considered either climatic climax (CwH zone) or edaphic climax on coarser material (CwH-af zone)
- with time, stand will open up when more age classes of trees are present, allowing more productive understories to develop

010-06	Western hemlock - Pacific silver fir - deer fern - moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal Section: Nootka
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone and yellow cedar subzone

Successional stage: mature climatic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (85)	Pacific silver fir western hemlock	60 60		
Tall shrub layer (10)	Pacific silver fir western hemlock	10 5		
Low shrub layer (variable)	red huckleberry western hemlock	5 5	Pacific silver fir salal oval-leaved blueberry	<5 <5 <5
Herb layer (10)			western sword fern deer fern	5 5
Moss, lichen and liverwort layer (variable)	eurhynchium moss plagiothecium moss	0-50 15		

CHARACTER SPECIES

Present	Absent
Pacific silver fir western hemlock plagiothecium moss	coast Douglas-fir yellow cedar

TERRAIN AND SOILS

Terrain: moraine; colluvium; fluvial
 Soil Texture: coarse
 Soil Association comp: H01,HP1,HT1,RS2,Q11,SR1,SS1
 Moisture regime: hygric
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0-800 m
 Slope: 0-40%
 Aspect: all
 Landscape position: normal to receiving, all slope positions

ECOLOGY

- dense tree canopy prevents much light reaching the low-cover, low-diversity understory
- excellent tree growth, with plentiful available moisture but no high water table

010-07

SR740033

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (65)	coast Douglas-fir western red cedar	50 10	western hemlock willows	5 7
Tall shrub layer (30)	cascara	15	willows coast Douglas-fir	10 10
Low shrub layer (25)	cascara	10	salmonberry black swamp gooseberry	5 5
Herb layer (90)	green false hellebore American vanilla leaf bracken	45 70 10	common lady fern horsetails foamflowers	7 5 7
Moss, lichen and liverwort layer (15)	mnium mosses	10	rhytiadelphus loreus moss	5

CHARACTER SPECIES

Present	Absent
western red cedar cascara green false hellebore American vanilla leaf	bigleaf maple red alder red huckleberry salal broad-leaved starflower

TERRAIN AND SOILS

Terrain: colluvial veneer
Soil Texture: coarse
Soil Association comp: HL1
Moisture regime: subhygric
Drainage: moderately well

TOPOGRAPHY

Elevation: 290 m
Slope: 10%
Aspect: 0%
Landscape position: receiving;
middle slope

ECOLOGY

- receiving seepage in a gully site
- moisture deficits during the growing season would be rare
- good forest productivity, with rich herbaceous diversity

010-08	Sitka spruce - salmonberry - skunk cabbage - sphagnum moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka; Hecate

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Coastal western hemlock - western red cedar zone

Successional stage: young seral to mature edaphic climax

Stand appearance: recently logged to dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	western hemlock Sitka spruce	50 20		
Tall shrub layer (60)	salmonberry red huckleberry oval-leaved blueberry	30 10 10	rusty Pacific menziesia	5
Low shrub layer (30)	red huckleberry salmonberry	5 15	sala	10
Herb layer (70)	deer fern western sword fern	50 10	cucumberroot twistedstalk common lady fern American skunk cabbage	<5 5 5
Moss, lichen and liverwort layer (35)	sphagnum moss hylocomium moss	5 25	leucolepis moss	<5

CHARACTER SPECIES

Present	Absent
leucolepis moss Sitka spruce American skunk cabbage salmonberry	Pacific silver fir Coast Douglas-fir

TERRAIN AND SOILS

Terrain: fluvial; moraine

Soil Texture: coarse

Soil Association comp: HP7,SR3,UC4

Moisture regime: hygric

Drainage: poor to imperfect

TOPOGRAPHY

Elevation: 0-150 m

Slope: 0

Aspect: all

Landscape position: receiving to
collecting, valley floor

ECOLOGY

- poorer drainage than 010-101, as evidenced by American skunk cabbage and sphagnum moss
- shrub layer is enhanced after logging, with trees slow to regenerate.

010-09	Western hemlock - Pacific silver fir - salal - deer fern - moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	western hemlock Pacific silver fir	40 20	western red cedar	10
Tall shrub layer (20)	western hemlock	10	red huckleberry rusty Pacific menziesia salal	5 <5 5
Low shrub layer (70)	salal red huckleberry	50 15	oval-leaved blueberry	5
Herb layer (60)	deer fern western sword fern	40 5		
Moss, lichen and liverwort layer (40)	eurhynchium moss hylocomium moss	10 20	plagiothecium moss	5

CHARACTER SPECIES

Present	Absent
salal Pacific silver fir rusty Pacific menziesia oval-leaved blueberry western red cedar	coast Douglas-fir Sitka spruce

TERRAIN AND SOILS

Terrain: fluvial; marine; moraine; colluvium
 Soil Texture: medium to coarse
 Soil Association comp: GL1,HP1,HR1,KO1,RS1,RS6,V2
 Moisture regime: hygric to subhygric
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0-550 m
 Slope: 0-45%
 Aspect: all
 Landscape position: receiving to normal, valley floor to middle slope

ECOLOGY

- high forestry capability
- distinguished from 010-10 by dense salal layer, lower western hemlock regeneration and presence of large, scattered western red cedar
- occurs on a wide variety of sites, usually with added moisture and nutrients from downslope movement
- one of the climatic climax types for the subzone

010-10	Western hemlock - Pacific silver fir - deer fern
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VEGETATION CHARACTERISTICS	
1. Dominant life form	
2. Dominant species	
3. Percent cover	
4. Percent cover	
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100. Percent cover	

Section: Nootka

Region: Outer Coastal Section: Nootka
Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature climatic climax

Successional stage: mature climatic climax
Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	western hemlock Pacific silver fir	50 30		
Tall shrub layer (20)	western hemlock	10	Pacific silver fir red huckleberry	5 <5
Low shrub layer (60)	red huckleberry western hemlock	5 10-40	salal Pacific silver fir salmonberry	<5 5 <5
Herb layer (variable)	deer fern western sword fern	5-30 <5	foamflowers	<5
Moss, lichen and liverwort layer (70)	eurhynchium moss rhytidiadelphus loreus moss hylocomium moss	15 varies 10-50		

CHARACTER SPECIES

CHARACTER SPECIES	
Present	Absent
Pacific silver fir deer fern	red alder devil's-club

TERRAIN AND SOILS	TOPOGRAPHY
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Terrain: fluvial; morainal blankets	Elevation: 0-400 m
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Terrain: fluvial; morainal blankets	Elevation: 0-400 m
Soil Texture: coarse	Slope: 0-25%
Soil Association comm. many soils	Aspect: all

Soil Association comp: many soils

Moisture regime: hydric to mesic
Drainage: moderately well to well

Drainage: moderately well to well	receiving, valley floor to middle slope
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TERRAIN AND SOILS	TOPOGRAPHY
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Elevation: 0-400 m

Elevation: 0-400 m
Slope: 0-25%
Aspect: all

Aspect: all
Landscape position: normal to

Landscape position: normal to receiving, valley floor to middle slope

ECOLOGY

- often occurs on floodplains; moisture supply always good
- open understories, with good coniferous regeneration
- type is easy to walk through, with high forestry capability
- probably climatic climax type for the subzone
- Pacific silver fir may be absent on some fluvial sites

010-11	SR740213
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young edaphic climax
 Stand appearance: open coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (20)	coast Douglas-fir lodgepole pine	10 7		
Low shrub layer (25)	Pacific madrone coast Douglas-fir lodgepole pine	5 10 7	salal red huckleberry	5 5
Herb layer (45)	kinnikinnick wood strawberry poverty oat grass	10 20 10	blue wild rye grass	5
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
lodgepole pine coast Douglas-fir kinnikinnick salal	western hemlock western red cedar

TERRAIN AND SOILS

Terrain: fluvio-glacial
 Soil Texture: coarse
 Soil Association comp: HMI
 Moisture regime: submesic
 Drainage: well

TOPOGRAPHY

Elevation: 440 m
 Slope: 30%
 Aspect: 225°
 Landscape position: shedding; upper slope

ECOLOGY

- badly burned site, with much exposed soil surface
- tree growth very slow
- summer moisture stresses very common
- a disturbed form of vegetation type 010-67

010-12	Pacific silver fir - Alaskan blueberry - deer fern - moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone and yellow cedar subzone

Successional stage: mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (80)	Pacific silver fir western hemlock	30-60 20-50	western red cedar	7
Tall shrub layer (15)	Pacific silver fir western hemlock	10 5		
Low shrub layer (50)	red huckleberry Alaskan blueberry	10 varies	oval-leaved blueberry western hemlock Pacific silver fir	10 10 5
Herb layer (variable)	deer fern five-leaved creeping raspberry	5-50 5	western sword fern foamflowers	<5 <5
Moss, lichen and liverwort layer (50)	rhytidiadelphus loreus moss plagiothecium moss	20 5	hylocomium moss	5

CHARACTER SPECIES

Present	Absent
Alaskan blueberry Pacific silver fir deer fern rhytidiadelphus loreus moss oval-leaved blueberry red huckleberry	devil's-club coast Douglas-fir yellow cedar

TERRAIN AND SOILS

Terrain: moraine; colluvium, fluvial
Soil Texture: medium to coarse
Soil Association comp: many

Moisture regime: hygric to mesic
Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0-850 m
Slope: 10-50%
Aspect: all
Landscape position: normal to receiving, valley floor to middle slope

ECOLOGY

- lower elevation climatic climax, with scattered remaining overmature western red cedar
- forest floor well-developed, containing majority of roots and nutrients
- nutrient supply often increased by seepage from upper slope positions
- productive forest for forestry
- variable diversity within herbaceous layer, with a varied shrub cover

010-13	Mountain hemlock - Cascade blueberry - red mountain-heather
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VEGETATION CHARACTERISTICS

Region: Outer Coastal; Inner Coastal Section: Nootka; Quadra
 Zone/Subzone: Subalpine mountain hemlock - Pacific silver fir zone:
 forested subzone and parkland subzone

Successional stage: mature climatic climax
 Stand appearance: open coniferous forest to krummholz

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (25)	mountain hemlock	20	yellow cedar Pacific silver fir	5 5
Tall shrub layer (15)			mountain hemlock yellow cedar Pacific silver fir	5 5 5
Low shrub layer (variable)	Cascade blueberry black blueberry	5-30 5	yellow cedar Alaskan blueberry	<5 5
Herb layer (40)	red mountain-heather Merten's cassiope	20 15	five-leaved creeping raspberry sedges	<5 <5
Moss, lichen and liverwort layer (variable)			dicranum mosses rhytidiopsis moss	varies varies

CHARACTER SPECIES

Present	Absent
red mountain-heather Merten's cassiope mountain hemlock yellow cedar Cascade blueberry	western hemlock red huckleberry Canadian bunchberry northern twinflower

TERRAIN AND SOILS

Terrain: morainal or colluvial veneer
 Soil Texture: medium to coarse
 Soil Association comp: GN1,RE6,RH6,SH7,S01
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 1100 - 1600 m
 Slope: 0-15%
 Aspect: all
 Landscape position: shedding to normal, upper slope to apex

ECOLOGY

- sites are usually exposed and/or on shallow soil materials, resulting in poor, stunted tree growth and open tree canopies
- shrubs associated with tree clumps, with heather and cassiope dominant in the openings
- good recreational values for diversity of landscapes
- snow persistent for long periods, resulting in short growing season but short-lived soil moisture deficits

010-14	Mountain hemlock - blueberries - five-leaved creeping raspberry
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VEGETATION CHARACTERISTICS

Region: Outer Coastal; Inner Coastal Section: Nootka; Quadra
 Zone/Subzone: Subalpine mountain hemlock - Pacific silver fir zone: forested subzone

Successional stage: mature climatic climax
 Stand appearance: open to dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (50)	Pacific silver fir mountain hemlock	10 30	yellow cedar	5
Tall shrub layer (20)	mountain hemlock Pacific silver fir	10 5	yellow cedar	5
Low shrub layer (50)	blueberries white-flowered rhododendron	30 15	Pacific silver fir	5
Herb layer (5)	five-leaved creeping raspberry	5	green false hellebore	<5
Moss, lichen and liverwort layer (5)			rhytidiopsis moss	5

CHARACTER SPECIES

Present	Absent
mountain hemlock Pacific silver fir yellow cedar five-leaved creeping raspberry	western hemlock red huckleberry Canadian bunchberry northern twinflower red mountain-heather

TERRAIN AND SOILS

Terrain: morainal blanket; colluvial veneers
 Soil Texture: medium to coarse
 Soil Association comp: RH1, RH6, SC1, S01
 Moisture regime: hygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 900 - 1250 m
 Slope: 5-70%
 Aspect: all
 Landscape position: normal to receiving, middle to upper slopes

ECOLOGY

- commonest type in forested subzone
- mainly forested, with wetter gullies with green false hellebore
- often sites are supplemented with seepage from upslope snowmelt; richer sites produce large yellow cedar
- soils deeply leached, with some forest floor accumulation supplying main source of nutrients to tree growth
- tree growth slow, due to short growing season; regeneration after disturbance is very slow

010-15	Mountain hemlock - western hemlock - blueberries
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VEGETATION CHARACTERISTICS

Region: Outer Coastal; Inner Coastal Section: Nootka, Quadra
 Zone/Subzone: Subalpine mountain hemlock - Pacific silver fir zone
 Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: mature climatic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (75)	mountain hemlock western hemlock yellow cedar	20 35 20	Pacific silver fir	15
Tall shrub layer (25)	Pacific silver fir mountain hemlock	10 10	western hemlock yellow cedar	<5 5
Low shrub layer (75)	Pacific silver fir blueberries	10 65	mountain hemlock western hemlock yellow cedar	5 <5 <5
Herb layer (15)	five-leaved creeping raspberry twayblades Canadian bunchberry	5 <5 5	blue-bead clintonia deer fern	<5 <5
Moss, lichen and liverwort layer (25)	rhytidadelphus loreus moss	20	rhytidopsis moss	5

CHARACTER SPECIES

Present	Absent
western hemlock mountain hemlock yellow cedar Pacific silver fir	western red cedar red mountain-heather Cascade blueberry

TERRAIN AND SOILS

Terrain: colluvial veneer; morainal blanket
 Soil Texture: medium to coarse
 Soil Association comp: C11,GN1,M11,R11,RH1,S16,S01
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 570-1200 m
 Slope: 0-80%
 Aspect: all
 Landscape position: receiving to shedding, middle to upper slopes

ECOLOGY

- much downslope moisture movement from snowmelt, making assessment of nutrient regimes difficult
- forest floor materials usually well established, providing a lot of nutrient availability
- type often intergrades between two forest zones, with a gradual increase in dominance of mountain hemlock over western hemlock with increasing elevation
- dense shrub-dominated understories precludes much herbaceous diversity or density
- forest productivities usually low to very low

010-16	Western hemlock - yellow cedar - oval-leaved blueberry - moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal; Inner Coastal Section: Nootka; Quadra
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: mature climatic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	western hemlock Pacific silver fir yellow cedar	40 10 30	western red cedar	<5
Tall shrub layer (30)	Pacific silver fir western hemlock	20 10		
Low shrub layer (30)	Pacific silver fir oval-leaved blueberry Alaskan blueberry	10 10 varies	western hemlock	5
Herb layer (10)	twayblades Canadian bunchberry	<5 <5	large-leaved rattlesnake orchid five-leaved creeping raspberry deer fern	<5 <5 <5
Moss, lichen and liverwort layer (70)	rhytidiadelphus loreus moss hylocomium moss	20 20-70		

Character Species

Present	Absent
yellow cedar western hemlock Pacific silver fir hylocomium moss large-leaved rattlesnake orchid	mountain hemlock red mountain-heather Cascade blueberry green false hellebore

TERRAIN AND SOILS

Terrain: morainal blanket; colluvium
 Soil Texture: medium
 Soil Association comp: C11,G11,R16,S11,S16
 Moisture regime: subhygric to mesic
 Drainage: well

TOPOGRAPHY

Elevation: 550-950 m
 Slope: 10-75%
 Aspect: all
 Landscape position: normal to receiving, middle slope

ECOLOGY

- usually very productive sites, often supplemented by upslope nutrient supplies
- well-developed forest floors
- dense understories, with little herbaceous density because of low light penetration and with dense beds of moss

010-17	SR740240
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young seral
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (7)			coast Douglas-fir	7
Tall shrub layer (60)	coast Douglas-fir lodgepole pine	25 35	western flowering dogwood red alder willows	10 5 5
Low shrub layer (40)	coast Douglas-fir western flowering dogwood	15 10	lodgepole pine red huckleberry common snowberry	7 5 10
Herb layer (40)	Pacific trailing blackberry western bracken	25 10		
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
coast Douglas-fir lodgepole pine western flowering dogwood baldfip rose	Pacific madrone western hemlock grand fir bigleaf maple

TERRAIN AND SOILS

Terrain: marine
 Soil Texture: coarse
 Soil Association comp: KY1
 Moisture regime: mesic
 Drainage: well

TOPOGRAPHY

Elevation: 50 m
 Slope: 13%
 Aspect: 200°
 Landscape position: normal;
 middle slope

ECOLOGY

- disturbed by burning and logging
- probably an early successional stage to vegetation type 010-67
- moisture stress will occur in late growing season
- forest productivity is low

010-18	Coast Douglas-fir - mountain hemlock - oval-leaved blueberry - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Subalpine mountain hemlock - Pacific silver fir zone

Successional stage: overmature seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (60)	coast Douglas-fir western hemlock	20 30	Pacific silver fir	10
Tall shrub layer (20)	western hemlock Pacific silver fir	5 10	yellow cedar mountain hemlock	<5 <5
Low shrub layer (30)	oval-leaved blueberry Pacific silver fir black blueberry	10 10 5	red huckleberry salal western hemlock	5 varies 5
Herb layer (<5)				
Moss, lichen and liverwort layer (25)	rhytidiopsis moss hylocomium moss	10 15		

CHARACTER SPECIES

Present	Absent
mountain hemlock western hemlock yellow cedar Pacific silver fir coast Douglas-fir	western red cedar (tree layer) fireweed

TERRAIN AND SOILS

Terrain: colluvial veneer; moraine

Soil Texture: medium to coarse

Soil Association comp: MI6,NI6,QI3,RE6,RI2,ST6

Moisture regime: mesic to submesic

Drainage: well to rapid

TOPOGRAPHY

Elevation: 600-1000 m

Slope: 20-80%

Aspect: all

Landscape position: shedding, upper slope

ECOLOGY

- vegetation type nearing transition into Subalpine mountain hemlock - Pacific silver fir zone
- herb layer nearly absent because of low light penetration
- sites generally shallow, drier-than-average, allowing initial growth of coast Douglas-fir, now only present as dominant trees and veterans
- disturbance on these shallow sites could lead to accelerated soil erosion and loss of present forest growth capabilities

010-19	SR750104
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VEGETATION CHARACTERISTICS

Region: Outer Coastal **Section:** Nootka
Zone/Subzone: Coastal western hemlock - Pacific silver fir zone:
western red cedar subzone

Successional stage: mature edaphic climax
Stand appearance: treed bog

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (15)	yellow cedar	10	lodgepole pine	5
Tall shrub layer (7)			lodgepole pine western hemlock	5 2
Low shrub layer (65)	common Labrador tea western swamp kalmia	25 25	salal red huckleberry	4 2
Herb layer (5)			round-leaved sundew northern starflower Canadian bunchberry	1 1 1
Moss, lichen and liverwort layer (50)	peat mosses	50	cladonia lichens	5

CHARACTER SPECIES

Present	Absent
lodgepole pine yellow cedar common Labrador tea western swamp kalmia round-leaved sundew	Pacific silver fir deer fern blueberries

TERRAIN AND SOILS

Terrain: organic blanket
Soil Texture: mesic
Soil Association comp: AT1
Moisture regime: hygric
Drainage: very poor

TOPOGRAPHY

Elevation: 10 m
Slope: 0%
Aspect: 270°
Landscape position: collecting;
coastal plain

ECOLOGY

- small forested "island" in large organic complex
- very representative of west and north coast organics, including those in the Coastal western hemlock-western red cedar zone

010-20	Western hemlock - coast Douglas-fir - salal - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar zone
 Successional stage: maturing seral
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Scrown cover	Associates	Scrown cover
Tree layer (70)	western hemlock coast Douglas-fir western red cedar	40 15 10		
Tall shrub layer (35)	western hemlock	30	red huckleberry	5
Low shrub layer (80)	red huckleberry blueberry salal	10 10 50-70	western hemlock	15
Herb layer (10)			northern twinflower western bracken Canadian bunchberry	5 <5 <5
Moss, lichen and liverwort layer (70)	hylocomium moss rhytidiadelphus loreus moss	50 20		

CHARACTER SPECIES

Present	Absent
western hemlock salal blueberry	rhytidiopsis moss Pacific silver fir western white trillium dicranum moss

TERRAIN AND SOILS

Terrain: fluvial; moraine; colluvium
 Soil Texture: medium to coarse
 Soil Association comp: CL1,GT1,HM1,QP1,RS7,ST1
 Moisture regime: subhygric to mesic
 Drainage: well to rapid

TOPOGRAPHY

Elevation: 50-700 m
 Slope: 0-80%
 Aspect: all
 Landscape position: shedding to normal, upper slope to valley floor

ECOLOGY

- highly productive forest, especially on fluvial sites
- found on edaphically dry sites within the Coastal western hemlock - Pacific silver fir zone
- dense tree regeneration and shrub layer inhibits herbaceous growth
- soils well leached, with thick L-F-H horizon

010-21	Western hemlock - Pacific silver fir - fireweed
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VEGETATION CHARACTERISTICS

Region: Inner Coastal, Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone and western red cedar subzone

Successional stage: young seral
 Stand appearance: recently logged

SPECIES COMPOSITION

Layer (\$ crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (0)				
Tall shrub layer (20)	western hemlock Pacific silver fir	10 10		
Low shrub layer (80)	Pacific silver fir western hemlock blueberry	20 5	coast Douglas-fir (planted) salal	5 <5
Herb layer (variable)	northern twinflower fireweed Canadian bunchberry	10 5-10 5-40		
Moss, lichen and liverwort layer (10)			hylocomium moss rhytidiopsis moss	5 5

CHARACTER SPECIES

Present	Absent
western hemlock (regeneration) Pacific silver fir (regeneration) fireweed	western hemlock (tree layer)

TERRAIN AND SOILS

Terrain: morainal or colluvial blanket
 Soil Texture: coarse
 Soil Association comp: BT1,K11,M11,N11,RV1
 Moisture regime: subhygric to mesic
 Drainage: well

TOPOGRAPHY

Elevation: 300-1000 m
 Slope: 0-50%
 Aspect: all
 Landscape position: shedding, middle to upper slope

ECOLOGY

- all sites logged; may be burned after logging; coast Douglas-fir planted
- will probably develop to vegetation type 010-25 or 010-18
- forestry capability medium, with good natural regeneration that is partially from Pacific silver fir released after logging

010-22

Coast Douglas-fir - western hemlock - moss

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young seral to mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (60)	western hemlock coast Douglas-fir	varies 30	coast Douglas-fir(veterans) western red cedar	<5 <5
Tall shrub layer (variable)	western hemlock	varies	western red cedar	<5
Low shrub layer (variable)	salal western hemlock	varies 5	red huckleberry western red cedar dull Oregon-grape	5 <5 <5
Herb layer (5)			northern twinflower large-leaved rattlesnake orchid	<5 <5
Moss, lichen and liverwort layer (75)	rhytidiadelphus loreus moss hylocomium moss rhytidiopsis moss	30 50 20	plagiothecium moss dicranum moss	<5 <5

CHARACTER SPECIES

Present	Absent
coast Douglas-fir salal rhytidiadelphus loreus moss red huckleberry	Pacific silver fir

TERRAIN AND SOILS

Terrain: fluvial; morainal blanket; colluvium
Soil Texture: medium to coarse
Soil Association comp: GT1,HM1,KT1,QP1,RT6

Moisture regime: subhygric to mesic
Drainage: well

TOPOGRAPHY

Elevation: 250-800 m
Slope: 0-60%
Aspect: all
Landscape position: normal to shedding, lower to upper slope

ECOLOGY

- dense western hemlock in tree layer and/or in shrub layer stops light penetration, so shrub and herb layers tend to be impoverished
- salal may be dense where the tree canopy opens
- moss layer very dense and diverse

010-23	Coast Douglas-fir - Pacific silver fir - common western pipsissewa - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone:
western red cedar subzone and yellow cedar subzone

Successional stage: overmature seral to mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (60)	western hemlock	50	coast Douglas-fir (veterans) western red cedar	<5 5
Tall shrub layer (20)	western hemlock	15	Pacific silver fir western red cedar	5 5
Low shrub layer (55)	western hemlock salal red huckleberry	10 10-50 15	Pacific silver fir dull Oregon-grape	5 <5
Herb layer (5)			northern twinflower Canadian bunchberry common western pipsissewa	<5 <5 <5
Moss, lichen and liverwort layer (60)	rhytidiopsis moss hylocomium moss rhytidiadelphus loreus moss	30 5-50 10		

CHARACTER SPECIES

Present	Absent
Pacific silver fir coast Douglas-fir rhytidiopsis moss dull Oregon-grape	western white trillium foamflower

TERRAIN AND SOILS

Terrain: morainal and colluvial blankets
Soil Texture: medium to coarse
Soil Association comp: F11,GR1,W11,W11,R16

Moisture regime: mesic
Drainage: well

TOPOGRAPHY

Elevation: 300-900 m
Slope: 5-50%
Aspect: south to southeast
Landscape position: normal to shedding, middle to upper slope

ECOLOGY

- occurs on drier-than-average sites, where snow tends to be shallow and short-lived
- several plants indicative of drier Coastal western hemlock zone
- dense tree regeneration and shrub layer greatly reduces light penetration, so herb layer is almost absent
- coast Douglas-fir is quite old (+200 years) but remains healthy

010-24	SR74158E
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat

Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: overmature seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (85)	western hemlock coast Douglas-fir	65 20	western red cedar	2
Tall shrub layer (0)				
Low shrub layer (0)				
Herb layer (0)				
Moss, lichen and liverwort layer (50)	rhytidiopsis moss dicranum mosses	30 20		

CHARACTER SPECIES

Present	Absent
western hemlock coast Douglas-fir	dull Oregon-grape salal red huckleberry Pacific silver fir

TERRAIN AND SOILS

Terrain: morainal blanket
Soil Texture: medium
Soil Association comp: QP1
Moisture regime: mesic
Drainage: well

TOPOGRAPHY

Elevation: 820 m
Slope: 10%
Aspect: 80°
Landscape position: shedding, apex

ECOLOGY

- dense tree canopy cuts out much light from reaching the forest floor
- western hemlock will eventually replace the coast Douglas-fir
- could be considered a "nudum" type for the subzone

010-25	Coast Douglas-fir - Pacific silver fir - American vanilla leaf - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal **Section:** Quadra
Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: overmature seral
Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	coast Douglas-fir western hemlock western red cedar	20 50 10	Pacific silver fir	5
Tall shrub layer (20)	western hemlock	10	Pacific silver fir western red cedar	8 5
Low shrub layer (80)	western hemlock red huckleberry blueberry	10 10 20-70	Pacific silver fir western red cedar	10 <5
Herb layer (15)	northern twinflower Canadian bunchberry American vanilla leaf	5 5 5	pipsissewa	<5
Moss, lichen and liverwort layer (40)	rhytidiadelphus loreus moss hylocomium moss	15 15	rhytidopsis moss	10

CHARACTER SPECIES

Present	Absent
coast Douglas-fir Pacific silver fir American vanilla leaf	yellow cedar mountain hemlock western white pine western bracken

TERRAIN AND SOILS

Terrain: colluvium; moraine; fluvial
Soil Texture: medium to coarse
Soil Association comp: HE3, HM1, MI2, NI1, QI1, QS1, RN3
Moisture regime: hygric to mesic
Drainage: well to rapid

TOPOGRAPHY

Elevation: 200-700 m
Slope: 20-55%
Aspect: all
Landscape position: normal to
receiving, upper to lower slope

ECOLOGY

- found either in drier areas of the Coastal western hemlock - Pacific silver fir zone or in wetter areas of the Coastal western hemlock zone
- coast Douglas-fir is overmature, long-living in the dominant tree canopy, but is not being replaced
- shrub layer is dense, with vigorous hemlock regeneration, so herb layer is sparse due to low light availability
- forestry capability is medium to high

010-26	Pacific silver fir - coast Douglas-fir - oval-leaved blueberry - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal, Outer Coastal Section: Quadra; Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone:
yellow cedar subzone and western red cedar subzone

Successional stage: overmature seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (85)	Pacific silver fir western hemlock	30 60	coast Douglas-fir	5
Tall shrub layer (20)	Pacific silver fir western hemlock	15 5		
Low shrub layer (40)	oval-leaved blueberry	35	red huckleberry	5
Herb layer (5)			deer fern American vanilla leaf	<5
Moss, lichen and liverwort layer (10-80)	rhytidiopsis moss	50	rhytidiadelphus loreus moss	5

CHARACTER SPECIES

Present	Absent
Pacific silver fir coast Douglas-fir oval-leaved blueberry American vanilla leaf	devil's-club salmonberry

TERRAIN AND SOILS

Terrain: colluvial veneer; morainal blanket
Soil Texture: medium to coarse
Soil Association comp: FI1,H03,LI6,RI7,S16,Z16
Moisture regime: mesic to submesic
Drainage: well to rapid

TOPOGRAPHY

Elevation: 350-1100 m
Slope: 15-70%
Aspect: all
Landscape position: shedding, middle to upper slope

ECOLOGY

- generally found on drier sites at lower elevations of the zone within the Inner Coastal Region
- coast Douglas-fir scattered but long-lived, never regenerating
- dense overstory precludes much herbaceous cover or diversity, though moss layer may be dense
- sites drier than average because of steep slopes and shallow materials

010-27	Pacific silver fir - western hemlock - moss
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VEGETATION CHARACTERISTICS

Regions: Outer Coastal
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone:
 western red cedar subzone and yellow cedar subzone

Successional stage: mature climatic climax
Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (85)	Pacific silver fir western hemlock	40 50		
Tall shrub layer (20)			western hemlock Pacific silver fir	10 10
Low shrub layer (15)	western hemlock	10	red huckleberry oval-leaved blueberry Pacific silver fir	<5 <5 <5
Herb layer (5)			deer fern	<5
Moss, lichen and liverwort layer (50)	hylocomium moss rhydiadelphus loreus moss	30 10	plagiothecium moss	<5

CHARACTER SPECIES

Present	Absent
Pacific silver fir western hemlock	coast Douglas-fir western sword fern devil's-club rhytidopsis moss Canadian bunchberry

TERRAIN AND SOILS

Terrain: morainal blanket
Soil Texture: medium to coarse
Soil Association comp: GL1,G11,Q11,RS1,SB1,SR4
Moisture regime: subhygric to mesic
Drainage: well

TOPOGRAPHY

Elevation: 300-800 m
Slope: 10-50%
Aspect: all
Landscape position: shedding to
normal, middle slope

ECOLOGY

- lower elevation type, with extremely dense tree and tree regeneration layers; other understory almost absent due to low light conditions
- stands are expected to open up as time passes, so more understory diversity could be expected
- forest floor material quite deep, containing most of tree roots and major source of nutrients

010-28	Pacific silver fir - western hemlock - oval-leaved blueberry - moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal Section: Nootka
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone:
 yellow cedar subzone

Successional stage: mature climatic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (80)	Pacific silver fir western hemlock	20-80 20-60	western red cedar	5
Tall shrub layer (10)	Pacific silver fir	5	western hemlock	<5
Low shrub layer (50)	oval-leaved blueberry Pacific silver fir	30 10	red huckleberry western hemlock	5 10
Herb layer (10)			deer fern blue-bead clintonia	5 <5
Moss, lichen and liverwort layer (70)	rhytidiopsis moss rhytidiadelphus loreus moss	65 10		

CHARACTER SPECIES

Present	Absent
Pacific silver fir oval-leaved blueberry rhytidiopsis moss	coast Douglas-fir devil's-club salal western sword fern

TERRAIN AND SOILS

Terrain: morainal blanket; colluvial veneer
 Soil Texture: medium
 Soil Association comp: E11,F11,M11,N13,Q11,R11
 Moisture regime: subhygric
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 650-900 m
 Slope: 0-40%
 Aspect: northeast to northwest
 Landscape position: normal to receiving, lower to upper slopes

ECOLOGY

- higher elevation climax forest, with good regeneration
- scattered old western red cedar trees may regenerate in a forest opening
- most productive of forested types in this subzone
- forest floor well developed, with nutrients sometimes supplemented by seepage
- moisture deficits uncommon, though snow melt may be slow; slightly cooler because of northerly aspects

Region: Inner Coastal **Section:** Malahat
Zone/Subzone: Subalpine mountain hemlock - Pacific silver fir zone:
forested subzone

Successional stage: mature climatic climax
Stand appearance: dense coniferous forest

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	Pacific silver fir western hemlock mountain hemlock	35 35 20		
Tall shrub layer (5)			Pacific silver fir	5
Low shrub layer (20)	Pacific silver fir	20	blueberries	2
Herb layer (<1)			wintergreens	<1
Moss, lichen and liverwort layer (60)	rhytidiopsis moss	60		

Present	Absent
Pacific silver fir western hemlock mountain hemlock	red huckleberry yellow cedar coast Douglas-fir

Terrain: colluvial veneer
Soil Texture: medium
Soil Association comp: RE1
Moisture regime: mesic
Drainage: well

Elevation. 1160 m
Slope: 0%
Aspect: level
Landscape position: shedding, apex

- dense tree canopy and tree regeneration stops most light from reaching the forest floor
- could be considered a "nudum" site, closely related to vegetation type 010-15

010-31

SR740321

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Subalpine mountain hemlock - Pacific silver fir zone

Successional stage: mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	Pacific silver fir mountain hemlock	40 30	western hemlock yellow cedar	10 5
Tall shrub layer (5)			mountain hemlock	5
Low shrub layer (10)	Pacific silver fir	7	mountain hemlock blueberries	5 <5
Herb layer (10)	five-leaved creeping raspberry foamflowers	5 5	few-flowered one-sided wintergreen	<5
Moss, lichen and liverwort layer (80)	rhytidiopsis moss	75	dicranum mosses	5

CHARACTER SPECIES

Present	Absent
Pacific silver fir mountain hemlock western hemlock yellow cedar five-leaved creeping raspberry	western red cedar red mountain-heather green false hellebore

TERRAIN AND SOILS

Terrain: colluvial blanket
Soil Texture: coarse
Soil Association comp: CW1
Moisture regime: subhygric
Drainage: well

TOPOGRAPHY

Elevation: 1040 m
Slope: 30%
Aspect: 2°
Landscape position: receiving,
upper slope

ECOLOGY

- dense tree canopy cuts out most light from reaching forest floor, resulting in very sparse understory
- very similar to vegetation type 010-15

010-32

Western hemlock - evergreen huckleberry - deer fern - moss

VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka; Hecate

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Coastal western hemlock - western red cedar zone

Successional stage: mature edaphic or climatic climax

Stand appearance: open to dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (50)	western hemlock western red cedar	25 25	lodgepole pine	<5
Tall shrub layer (30)	western red cedar western hemlock	10 10	red huckleberry rusty Pacific menziesia	5 <5 <5
Low shrub layer (90)	salal evergreen huckleberry	70 15	western red cedar western hemlock rusty Pacific menziesia	5 5 5
Herb layer (variable)	deer fern Canadian bunchberry	10-70 5	northern twinflower two-leaved false Solomon's-seal	5 <5
Moss, lichen and liverwort layer (30)	hylocomium moss eurhynchium moss	15 10	peat mosses rhytidiadelphus loreus moss	<5 <5

CHARACTER SPECIES

Present	Absent
evergreen huckleberry western red cedar Canadian bunchberry northern twinflower	western sword fern twayblades Pacific silver fir coast Douglas-fir Sitka spruce five-leaved creeping raspberry

TERRAIN AND SOILS

Terrain: colluvium; moraine; fluvial; marine

Soil Texture: medium to coarse

Soil Association comp: HK1,HK5,HP8,HT1,NT1,SR1,T01,V1

Moisture regime: subhygric to mesic

Drainage: imperfect to moderately well

TOPOGRAPHY

Elevation: 0 - 300 m

Slope: 0 - 15%

Aspect: all

Landscape position: normal to receiving, lower slope to plain

ECOLOGY

- scrub forest of west coast lowland plain, similar on deep and shallow materials
- extremely dense shrub layer; difficult to penetrate on foot; little light available for herbaceous plants other than ferns
- many cedars with multiple, dead tops
- diverse range of microsites, but forest relatively homogenous due to overriding influence of climatic factors, such as humidity and mildness

010-33	Western red cedar - salal - five-leaved creeping raspberry - moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal Section: Nootka; Hecate
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
 Coastal western hemlock - western red cedar zone: shore pine subzone

Successional stage: overmature seral to mature climatic or edaphic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (60)	western red cedar western hemlock	35 25		
Tall shrub layer (30)	wetern red cedar western hemlock	10 15	rusty Pacific menziesia	5
Low shrub layer (80)	red huckleberry blueberries salal	5 10 60	western hemlock western red cedar	5 <5
Herb layer (30)	five-leaved creeping raspberry Canadian bunchberry deer fern	5 5 10	twayblades two-leaved false Solomon's-seal	<5 <5
Moss, lichen and liverwort layer (variable)	hylocomium moss rhytidiadelphus loreus moss	5-60 10	peat mosses	<5

CHARACTER SPECIES

Present	Absent
five-leaved creeping raspberry twayblades western red cedar	western sword fern evergreen huckleberry coast Douglas-fir Sitka spruce

TERRAIN AND SOILS

Terrain: moraine; colluvium; organic veneer
 Soil Texture: medium to coarse
 Soil Association comp: GL1, HM1, OE5, OV1, RY1, SR1, SW8

Moisture regime: subhydryc to subhygric
 Drainage: imperfect to moderately well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 0 - 40%
 Aspect: all
 Landscape position: receiving seepage, valley floor to middle slope

ECOLOGY

- excessive soil moisture for much of the growing season, because of impermeable layers in soil or bedrock
- forest growth moderate to poor, with numerous wetter openings with peat moss and American skunk cabbage
- Pacific silver fir may be present in low quantities on sites with slightly improved drainage or higher mounds of forest floor material

010-34	Shore pine - common Labrador tea - sundews - peat mosses
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka: Hectate

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
Coastal western hemlock - western red cedar zone: shore pine subzone

Successional stage: mature edaphic climax

Stand appearance: open coniferous forest to open bog

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (5)			lodgepole pine western red cedar	5 <5
Tall shrub layer (25)	shore pine western red cedar	15 10	western hemlock	<5
Low shrub layer (variable)	shore pine western swamp kalmia salal	5-15 10-25 5-30	common Labrador tea western red cedar western hemlock	5 <5
Herb layer (30)	crowberry sundews sedges	25 <5 10-40	deer fern apargidium two-leaved false Solomon's-seal	<5 varies <5
Moss, lichen and liverwort layer (50)	peat mosses	50		

CHARACTER SPECIES

Present	Absent
peat mosses shore pine salal common Labrador tea sundews crowberry	yellow cedar mountain hemlock Pacific silver fir Sitka sedge

TERRAIN AND SOILS

Terrain: organic blanket or veneer; marine

Soil Texture: fine; mesic

Soil Association comp: AL1,AT1,SR3,T01,V1

Moisture regime: hygric to hydric

Drainage: poor

TOPOGRAPHY

Elevation: 0 - 300 m

Slope: 0

Aspect: all

Landscape position: collecting,
lower slope to valley floor

ECOLOGY

- variable type ranging from fairly dense scrubby forest on mineral soils to open sphagnum bogs on deeper organics in depressional areas
- nutrient availability poor, with high water table of poorly oxygenated water
- especially common vegetation type on the coastal plain near Port Hardy and down the west coast of Vancouver Island

010-35	Lodgepole pine - coast Douglas-fir - selaginella - rhacomitrium moss
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VEGETATION CHARACTERISTICS

Region: Outer Coastal; Inner Coastal Section: Nootka; Quadra
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
 Subalpine mountain hemlock - Pacific silver fir zone
 Coastal western hemlock zone: western hemlock subzone
 Successional stage: mature edaphic climax
 Stand appearance: open coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (20)	lodgepole pine	15	coast Douglas-fir yellow cedar	<5 <5
Tall shrub layer (5)	lodgepole pine	<5	yellow cedar coast Douglas-fir	<5 <5
Low shrub layer (<5)			salal	<5
Herb layer (<5)	selaginella	<5	penstemon	<5
Moss, lichen and liverwort layer (variable)	rhacomitrium moss	10-50		

CHARACTER SPECIES

Present	Absent
lodgepole pine coast Douglas-fir rhacomitrium moss selaginella	Pacific silver fir Sitka spruce peat moss sedges

TERRAIN AND SOILS

Terrain: colluvial veneer; bedrock
 Soil Texture: coarse
 Soil Association comp: RE6,R0
 Moisture regime: xeric to subxeric
 Drainage: rapid

TOPOGRAPHY

Elevation: 0 - 900 m
 Slope: 0 - 50%
 Aspect: all
 Landscape position: shedding, upper slope to apex

ECOLOGY

- sites with little soil, so moisture holding capacity is low, with summer drought conditions
- type could be easily destroyed by any vegetation removal
- often seen along immediate coastline by salt water with wet regional climates
- denser understories concentrated in pockets of deeper material

010-36	Shore pine - yellow cedar - western swamp kalmia - peat mosses
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VEGETATION CHARACTERISTICS

Region: Outer Coastal **Section:** Nootka; Hecate
Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
Coastal western hemlock - western red cedar zone: shore pine subzone

Successional stage: mature edaphic climax
Stand appearance: treed bog

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (10)	shore pine yellow cedar	5 5	western red cedar western hemlock mountain hemlock	<5 <5 <5
Tall shrub layer (20)	shore pine yellow cedar	5 10	western red cedar western hemlock mountain hemlock	5 <5 <5
Low shrub layer (50)	shore pine western hemlock mountain hemlock	5-10 5-20 5	yellow cedar western swamp kalmia western red cedar	10 5 <5
Herb layer (40)	Canadian bunchberry rushes northern starflower	10 10 5	spleenwort-leaved goldthread deer cabbage northern twinflower	5 varies <5
Moss, lichen and liverwort layer (70)	peat mosses	15-50	rhytidiadelphus loreus moss plagiothecium moss	5-30 5-30

CHARACTER SPECIES

Present	Absent
yellow cedar	Pacific silver fir
shore pine	Sitka spruce
peat mosses	five-leaved creeping raspberry
deer cabbage	blue-bead clintonia
rushes	hardhack
mountain hemlock	

TERRAIN AND SOILS

Terrain: organic blanket or veneer
Soil Texture: mesic
Soil Association comp: AK1,AK5,AL1,AL5,SR1x

Moisture regime: hygric to hydric
Drainage: poor to very poor

TOPOGRAPHY

Elevation: 200 - 500 m
Slope: 0 - 25%
Aspect: all
Landscape position: seepage to
collecting, valley floor to middle
slope

ECOLOGY

- edaphic climax bog forests, developed on sites with greater than average soil water
- hummocky surface with drier sites and open water pools lead to plant diversity
- cold air pooling indicated by mountain hemlock and yellow cedar
- organic accumulation faster than decomposition due to oxygen-poor conditions; low nutrient availability
- extensive type within the Coastal western hemlock - western red cedar zone on the northern tip of Vancouver Island and on parts of the western coastal plain
- system appears to be undergoing shift from forest to organic peatland

010-37	SR74023E
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (90)	western hemlock	50 45		
Tall shrub layer (10)			western hemlock Pacific silver fir	5 5
Low shrub layer (35)	western hemlock Pacific silver fir	20 15	red huckleberry	1
Herb layer (5)	western sword fern	5		
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
western hemlock Pacific silver fir	blueberries salal yellow cedar mountain hemlock

TERRAIN AND SOILS

Terrain: colluvial veneer
Soil Texture: medium
Soil Association comp: RI2
Moisture regime: mesic
Drainage: well

TOPOGRAPHY

Elevation: 670 m
Slope: 25%
Aspect: 45°
Landscape position: normal,
upper slope

ECOLOGY

- extremely dense coniferous forests, only understory is regenerating coniferous species
- could be considered a "nudum" type
- overmature stand, with many decadent trees that are weakened by disease
- excellent forest regeneration

010-38	SR74164E
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Malahat
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: mature edaphic climax
 Stand appearance: bog

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (0)				
Low shrub layer (10)	western swamp kalmia bog blueberry	2 5	common Labrador tea	2
Herb layer (95)	sedges marsh cinquefoil	80 50		
Moss, lichen and liverwort layer (80)	peat moss	80		

CHARACTER SPECIES

Present	Absent
common Labrador tea marsh cinquefoil sedges western swamp kalmia bog blueberry	shore pine bog cranberry salal western hemlock

TERRAIN AND SOILS

Terrain: organic blanket
 Soil Texture: mesic
 Soil Association comp: A17
 Moisture regime: hygric
 Drainage: poor

TOPOGRAPHY

Elevation: 800 m
 Slope: 0°
 Aspect: level
 Landscape position: collecting;
 depression

ECOLOGY

- high water table, with open standing water
- poor oxygenation and very low nutrient availability results in absence of trees

010-39	Yellow cedar - sedges - peat mosses
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VEGETATION CHARACTERISTICS

Region: Outer Coastal; Inner Coastal Section: Hecate; Nootka; Quadra
 Zone/Subzone: Coastal western hemlock - western red cedar zone: shore pine subzone
 Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone
 Subalpine mountain hemlock - Pacific silver fir zone
 Successional stage: mature edaphic climax
 Stand appearance: open bog forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (<5)			mountain hemlock western hemlock	<5 <5
Tall shrub layer (<5)			yellow cedar	<5
Low shrub layer (variable)	oval-leaved blueberry	varies	yellow cedar mountain hemlock rusty Pacific menziesia	<5 <5 5
Herb layer (variable)	sedges	varies	Canadian bunchberry American skunk cabbage	<5 <5
Moss, lichen and liverwort layer (50)	peat mosses	50		

CHARACTER SPECIES

Present	Absent
sedges peat mosses yellow cedar American skunk cabbage	western red cedar shore pine

TERRAIN AND SOILS

Terrain: organic veneer or blanket
 Soil Texture: fibric
 Soil Association comp: A11,A17,A51,S01
 Moisture regime: hygric
 Drainage: poor

TOPOGRAPHY

Elevation: 600 - 1050 m
 Slope: 0%
 Aspect: all
 Landscape position: collecting,
 middle to upper slope

ECOLOGY

- variable forest - bog transition at higher elevations, usually in topographic hollows
- low nutrient availability because of collecting water; forest productivity very low
- organic accumulation surpasses decomposition

010-40	SR750044
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature edaphic climax

Stand appearance: treed bog

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (15)			western hemlock western red cedar Sitka spruce	7 5 5
Tall shrub layer (5)			western hemlock western red cedar	>5 >5
Low shrub layer (7)	western swamp kalmia salal rusty Pacific menziesia	<5 <5 <5	common Labrador tea hardhack western hemlock	<5 <5 <5
Herb layer (95)	sedges tufted hair grass spleenwort-leaved goldthread	90 25 7	foamflowers wood-rushes violets	5 10 15
Moss, lichen and liverwort layer (10)			peat mosses mniun mosses	5 <5

CHARACTER SPECIES

Present	Absent
western swamp kalamia sedges western hemlock tufted hair grass spleenwort-leaved goldthread	Pacific silver fir yellow cedar shore pine

TERRAIN AND SOILS

Terrain: organic blanket
Soil Texture: mesic
Soil Association comp: AT1
Moisture regime: hygric
Drainage: poor

TOPOGRAPHY

Elevation: 760 m
Slope: 0°
Aspect: level
Landscape position: collecting;
lower slope

ECOLOGY

- organic site with high species diversity, especially in the herbaceous layer
- high water table limits nutrient availability, so tree growth is slow and stunted

010-41	Coast Douglas-fir - salal - dull Oregon-grape - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Malahat, Quadra

Zone/Subzone: Coastal grand fir - western red cedar zone
Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	coast Douglas-fir	80		
Tall shrub layer (15)	coast Douglas-fir	10	western red cedar oceanspray	varies 5
Low shrub layer (80)	salal dull Oregon-grape	10-60 5-30	common snowberry	1-10
Herb layer (10)			large-leaved rattlesnake orchid coralroot western bracken	<5 <5 1-10
Moss, lichen and liverwort layer (10-70)	eurhynchium moss	50	hylocomium moss rhytidiadelphus moss	5 <5

CHARACTER SPECIES

Present	Absent
common snowberry oceanspray	western hemlock Pacific madrone red alder lodgepole pine

TERRAIN AND SOILS

Terrain: colluvial veneer; morainal blanket; fluvioglacial
Soil Texture: medium to coarse
Soil Association comp: A1,H1,R1,RB6,RL1,RL6,S5,QU3

Moisture regime: mesic to subxeric
Drainage: well to rapid

TOPOGRAPHY

Elevation: 0 - 500 m
Slope: 0 - 40%
Aspect: southwest to southeast
Landscape position: normal to
shedding, valley floor to upper
slope

ECOLOGY

- shallow soils and/or southern aspects contribute to slightly drier-than-average moisture conditions, with higher evapotranspiration losses later in growing season
- western hemlock regeneration usually absent

010-42	Coast Douglas-fir - Pacific madrone - evergreen huckleberry - rhacomitrium moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone. western red cedar subzone

Successional stage: edaphic climax
 Stand appearance: open mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (30)	Pacific madrone coast Douglas-fir	10 10	lodgepole pine	10
Tall shrub layer (10)	coast Douglas-fir Pacific madrone	5 5		
Low shrub layer (60)	evergreen huckleberry salal	40 20	baldhip rose dull Oregon-grape	5 5
Herb layer (10)	American vanilla leaf	<5	northern twinflower broad-leaved starflower Pacific trailing blackberry	<5 <5 <5
Moss, lichen and liverwort layer (15)	rhacomitrium moss eurhynchium moss	5 10	hairy-cap moss	<5

CHARACTER SPECIES

Present	Absent
lodgepole pine Pacific madrone rhacomitrium moss hairy-cap moss	red huckleberry

TERRAIN AND SOILS

Terrain: colluvial veneer
 Soil Texture: medium to coarse
 Soil Association comp: RT6,ST6
 Moisture regime: mesic
 Drainage: rapid

TOPOGRAPHY

Elevation: 50 - 200 m
 Slope: 10 - 25%
 Aspect: south to southeast
 Landscape position: shedding, lower to middle slope

ECOLOGY

- rocky shallow site with hot aspect
- rare type in wetter west coast area

010-43

Bigleaf maple - western sword fern - northern maidenhair fern

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to overmature seral

Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (75)	bigleaf maple	30-80	western red cedar western hemlock	10 5-20
Tall shrub layer (10)			western red cedar western hemlock grand fir	<5 <5 <5
Low shrub layer (30)	salmonberry willows	5-20 <5	western hemlock western red cedar	<5 <5
Herb layer (80)	western sword fern American vanilla leaf northern maidenhair fern	5-70 5 5-10	common lady fern bedstraws sedges	<5 <5 <5
Moss, lichen and liverwort layer (<5)			mnium moss leucolepis moss	<5 <5

CHARACTER SPECIES

Present	Absent
mnium moss bigleaf maple northern maidenhair fern Pacific bleedingheart grand fir	American skunk cabbage red alder Sitka spruce salal

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: medium to coarse
Soil Association comp: B1,CH4,HM1,KA4

Moisture regime: hygric to submesic
Drainage: imperfect

TOPOGRAPHY

Elevation: 0 - 300 m
Slope: 0 - 2%
Aspect: all
Landscape position: receiving, lower slope

ECOLOGY

- seepage slopes with little physical ground disturbance, appears to favour bigleaf maple over red alder
- rich, diverse herbaceous layer indicates good moisture availability and nutrient regime
- coniferous regeneration slow due to low light and herbaceous competition; however, forest capability medium to high

010-44	Dune wild rye grass - seabeach sandwort
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Malahat; Quadra; Nootka
 Zone/Subzone: Coastal grand fir - western red cedar zone
 Coastal western hemlock zone: coast Douglas-fir subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
 Successional stage: mature edaphic climax
 Stand appearance: pioneer herbaceous

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (<5)				
Low shrub layer (<5)			salal twinberry honeysuckle Nootka rose	<5 <5 <5
Herb layer (variable)	peavines Pacific silver weed dune wild rye grass tufted hair grass	varies varies varies varies	seabeach sandwort entire-leaved gumweed American winter cress	varies varies varies
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
seabeach sandwort dune wild rye grass	glasswort sea plantain Lyngbye's sedge coast Douglas-fir hardhack

TERRAIN AND SOILS

Terrain: marine beaches
 Soil Texture: sandy
 Soil Association comp: CB
 Moisture regime: submesic to xeric
 Drainage: well to rapidly drained

TOPOGRAPHY

Elevation: 0 - 5 m
 Slope: 5%
 Aspect: all
 Landscape position: lower slope to valley bottom

ECOLOGY

- very variable, often with low vegetative cover
- substrate often covered with driftwood

010-45	Coast Douglas-fir - salal - western bracken - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat; Quadra

Zone/Subzone: Coastal grand fir - western red cedar zone

Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (75)	coast Douglas-fir	50-80	Pacific madrone	<5
Tall shrub layer (20)	coast Douglas-fir oceanspray	5-30 10-20	western red cedar	<5
Low shrub layer (variable)	salal dull Oregon-grape	10-95 20	western trumpet honeysuckle	<5
Herb layer (15)	western fescue Pacific trailing blackberry western bracken	<5 <5 1-15	broad-leaved starflower sweet-scented bedstraw western sword fern large-leaved rattlesnake orchid	<5 <5 <5 <5
Moss, lichen and liverwort layer (60-80)	eurhynchium moss hylocomium moss red-stemmed rhytidiadelphus loreus moss	30-80 5-20 5-20		

CHARACTER SPECIES

Present	Absent
coast Douglas-fir Pacific madrone western trumpet honeysuckle oceanspray	western hemlock Garry oak grand fir bigleaf maple red huckleberry

TERRAIN AND SOILS

Terrain: colluvial veneer, moraine, marine

Soil Texture: medium to coarse

Soil Association comp: D1,FF1,HL6,QU1,RJ6,SE1,TM1

Moisture regime: mesic to xeric

Drainage: moderately well to rapid

TOPOGRAPHY

Elevation: 30 - 400 m

Slope: 0 - 35%

Aspect: all

Landscape position: variable

ECOLOGY

- drier than average sites, probably leading to an edaphic climax of coast Douglas-fir
- dense low shrub cover prevents much light penetration for herbaceous growth
- tree growth slow after disturbance

010-46

Coast Douglas-fir - western red cedar - dull Oregon-grape - moss

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat; Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (90)	coast Douglas-fir	80	red alder	5-10
Tall shrub layer (10)	western red cedar	1-10	western hemlock coast Douglas-fir	5 5
Low shrub layer (30-90)	salal dull Oregon-grape	20-80 5-30	red huckleberry western hemlock western red cedar	<5 <5 <5
Herb layer (15)	western bracken American vanilla leaf	10 1-20	Pacific trailing blackberry sweet-scented bedstraw wall-lettuce	<5 <5 <5
Moss, lichen and liverwort layer (80)	eurhynchium moss hylocomium moss	30-90 5-20	rhytidiadelphus moss	<5

CHARACTER SPECIES

Present	Absent
western hemlock sweet-scented bedstraw coast Douglas-fir	lodgepole pine Pacific madrone

TERRAIN AND SOILS

Terrain: morainal blanket; fluvial; colluvium
 Soil Texture: medium to coarse
 Soil Association comp: HA4,HA7,HL6,Q1,Q3,Q4,QN1,S1,S2
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 320 m
 Slope: 0 - 20%
 Aspect: all
 Landscape position: normal to receiving, plain to middle slope

ECOLOGY

- generally considered average type for coast Douglas-fir subzone, with enough available moisture to encourage western hemlock and western red cedar regeneration
- type has medium to high forestry capability, especially for coast Douglas-fir

010-47	Coast Douglas-fir - salal - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (60)	coast Douglas-fir	60		
Tall shrub layer (15)	coast Douglas-fir	5-20	western hemlock	<5
Low shrub layer (60)	salal dull Oregon-grape	15-90 20	red huckleberry	5
Herb layer (15)	Pacific trailing blackberry	10	western bracken western sword fern	<5 <5
Moss, lichen and liverwort layer (variable)	eurhynchium moss	5-60	hylocomium moss	5

CHARACTER SPECIES

Present	Absent
salal coast Douglas-fir western hemlock	western red cedar red alder baldhip rose

TERRAIN AND SOILS

Terrain: fluvial; glaciofluvial; moraine
 Soil Texture: coarse
 Soil Association comp: D1,D2,D7,HM1,KY1,QN1,R2,RA1,RB1
 Moisture regime: mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 0 - 25%
 Aspect: all
 Landscape position: normal

ECOLOGY

- climatically, slightly drier than 010-48, as evidenced by low cover of western sword fern and dense shrub layer dominated by salal
- dense shrub layer inhibits herbaceous establishment
- coarse soils provide lower than average nutrient and moisture holding capabilities; late growing season drought common

010-48

Coast Douglas-fir - western hemlock - western sword fern

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (90)	coast Douglas-fir	90	western hemlock	varies
Tall shrub layer (5)			western hemlock coast Douglas-fir	<5 5
Low shrub layer (15)	dull Oregon-grape red huckleberry	5 1-10	oval-leaved blueberry	<5
Herb layer (10-60)	western sword fern American vanilla leaf	5-50 5-30	western bracken wall-lettuce sweet-scented bedstraw	1-10 <5 <5
Moss, lichen and liverwort layer (65)	eurhynchium moss hylocomium moss	60 5		

CHARACTER SPECIES

Present	Absent
western hemlock western sword fern hylocomium moss	baldhip rose red alder foamflowers common lady fern mniun moss

TERRAIN AND SOILS

Terrain: fluvial; glaciofluvial; moraine
 Soil Texture: coarse
 Soil Association comp: B1,HA2,HA7,HM1,RA4,RB1,RN4,T4
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 350 m
 Slope: 0 - 25%
 Aspect: all
 Landscape position: normal to receiving, valley floor to middle slope

ECOLOGY

- nutrient rich site due to receiving water and nutrients from upslope
- shrub understory very open, with a variable herb cover depending upon density of tree canopy
- moderate to high forestry capability
- climatically moister than 010-49, as evidenced by western hemlock regeneration and oval-leaved blueberry, and lack of baldhip rose and oceanspray

010-49

Coast Douglas-fir - western red cedar - western sword fern - moss

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat; Quadra

Zone/Subzone: Coastal grand fir - western red cedar zone

Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (70)	coast Douglas-fir	30-70	red alder bigleaf maple	1-30 1-30
Tall shrub layer (30)	coast Douglas-fir western red cedar	10 15	oceanspray grand fir	5 <5
Low shrub layer (40-90)	dull Oregon-grape salal	5-40 10-50	red huckleberry rose	5 <5
Herb layer (variable)	western sword fern American vanilla leaf western bracken	varies 5 5	Pacific trailing blackberry broad-leaved starflower sweet-scented bedstraw	<5 <5 <5
Moss, lichen and liverwort layer (variable)	eurhynchium moss hylocomium moss	20-80 5		

CHARACTER SPECIES

Present	Absent
grand fir bigleaf maple western sword fern	Pacific madrone western flowering dogwood common snowberry

TERRAIN AND SOILS

Terrain: moraine; marine; fluvial
 Soil Texture: medium to coarse
 Soil Association comp: D1,FF1,H1,KT1,QU1,RA2,RB6,S1,SE1,TM6
 CA4,CH1
 Moisture regime: subhydric to mesic
 Drainage: moderately well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 0 - 15%
 Aspect: all
 Landscape position: variable, on wide range of slope positions

ECOLOGY

- found on sites with better-than-average to average moisture and nutrient availability, leading towards a grand fir - western red cedar climax
- climatically moister than 010-50, as evidenced by lack of western flowering dogwood and presence of grand fir

Region: Inner Coastal **Section:** Malahat; Quadra
Zone/Subzone: Coastal grand fir - western red cedar zone
Coastal western hemlock zone: coast Douglas-fir subzone

SPECIES COMPOSITION				
Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (60)	coast Douglas-fir	60		
Tall shrub layer (30)	oceanspray	10-20	western red cedar coast Douglas-fir western flowering dogwood bigleaf maple	<5 10 <5 5
Low shrub layer (70)	salal dull Oregon-grape	30-90 5-30	red huckleberry Nootka rose common snowberry	<5 <5 5-10
Herb layer (variable)	western sword fern western bracken American vanilla leaf	varies varies 5	Pacific trailing blackberry broad-leaved starflower	1-10 <5
Moss, lichen and liverwort layer (50)	eurhynchium moss hylocomium moss	15-70 15-70	rhytiadelphus moss	<5

Present	Absent
western flowering dogwood common snowberry western sword fern	Pacific madrone grand fir western hemlock trailplant

Terrain: moraine; marine
Soil Texture: fine to medium
Soil Association comp: Al,FF1,H1,HC1,RA1,SE1
Moisture regime: mesic
Drainage: moderately well to well

Elevation: 30 - 100 m
Slope: 0 - 10%
Aspect: all
Landscape position: normal, valley
floor to middle slope

- mesic sites with frequent disturbance history, so regeneration of western red cedar is slow
- dense shrub layer often inhibits herbaceous cover

010-51	Western hemlock - red alder - western sword fern - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: young to maturing seral

Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (85)	western hemlock coast Douglas-fir red alder	60 35 5		
Tall shrub layer (15)	western hemlock	10	western red cedar	5
Low shrub layer (<5)				
Herb layer (20)	western sword fern	10	western bracken	varies
Moss, lichen and liverwort layer (80)	eurhynchium moss plagiothecium moss	60 15		

CHARACTER SPECIES

Present	Absent
red alder western hemlock western sword fern plagiothecium moss	salal Pacific silver fir American vanilla leaf deer fern

TERRAIN AND SOILS

Terrain: fluvial; moraine
 Soil Texture: medium
 Soil Association comp: HM1, H03, QS3
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 100 - 300 m
 Slope: 5 - 15%
 Aspect: all
 Landscape position: receiving, lower to middle slope

ECOLOGY

- similar to 010-59, but climatically moister, with better growth of western hemlock
- alder established after surface disturbance of forest floor

010-52	Coast Douglas-fir - lodgepole pine - western hemlock - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (70)	coast Douglas-fir	60	lodgepole pine	15
Tall shrub layer (25)	coast Douglas-fir western hemlock	15 10	western red cedar	5
Low shrub layer (90)	salal western hemlock red huckleberry	80 <5 5	dull Oregon-grape baldhip rose western red cedar	10 5 <5
Herb layer (20)	western bracken	15	Pacific trailing blackberry large-leaved rattlesnake orchid northern twinflower	<5 <5 <5
Moss, lichen and liverwort layer (25)	eurhynchium moss hylocomium moss	15 10		

CHARACTER SPECIES

Present	Absent
western hemlock lodgepole pine	evergreen huckleberry

TERRAIN AND SOILS

Terrain: fluvial; marine; morainal
Soil Texture: coarse
Soil Association comp: D2,HL1,HM1,KA1,Q1,Q3,QP1,SP1
Moisture regime: mesic
Drainage: well to rapid

TOPOGRAPHY

Elevation: 0 - 400 m
Slope: 0 - 6%
Aspect: all
Landscape position: shedding to normal, valley floor to middle slope

ECOLOGY

- climatically moister than 010-67, as evidenced by regeneration of western hemlock and western red cedar
- coarse textures result in poor nutrient availability and moisture holding capacity, leading to earlier-than-average summer moisture deficits
- forestry regeneration is slow, with low capabilities

010-53	SR740135
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: overmature seral

Stand appearance: open mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (20)	bigleaf maple western hemlock	15 7		
Tall shrub layer (30)	salmonberry red elderberry	10 15	bigleaf maple	7
Low shrub layer (15)			red elderberry salmonberry western thimbleberry	5 5 5
Herb layer (15)	sylvan goat's-beard western sword fern deer fern	5 10 5	wall lettuce	5
Moss, lichen and liverwort layer (90)	rhytidiadelphus moss	70	hylocomium moss	10

CHARACTER SPECIES

Present	Absent
bigleaf maple western hemlock red elderberry	western red cedar coast Douglas-fir red alder Sitka spruce

TERRAIN AND SOILS

Terrain: fluvial
Soil Texture: coarse
Soil Association comp: H08
Moisture regime: mesic
Drainage: rapid

TOPOGRAPHY

Elevation: 130 m
Slope: 10%
Aspect: 270°
Landscape position: normal,
middle slope

ECOLOGY

- deciduous dominated floodplain forest, with dense shrub layer
- unusual absence of red alder; may be seed supply problem after disturbance occurred
- successional change to western hemlock climax is very slow

010-54	Western hemlock - dull Oregon-grape - western sword fern - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock suzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (90)	coast Douglas-fir western hemlock	75 20		
Tall shrub layer (10)	western hemlock	5	western red cedar	<5
Low shrub layer (variable)	salal dull Oregon-grape	10-90 10	red huckleberry western hemlock	<5 <5
Herb layer (30)	western sword fern	5-30	western bracken American vanilla leaf	<5 <5
Moss, lichen and liverwort layer (variable)	eurhynchium moss hylocomium moss	10-90 5	plagiothecium moss	<5

CHARACTER SPECIES

Present	Absent
western hemlock dull Oregon-grape hylocomium moss coast Douglas-fir salal	Pacific silver fir oval-leaved blueberry deer fern

TERRAIN AND SOILS

Terrain: moraine; colluvial; fluvial

Soil Texture: medium to coarse

Soil Association comp: A1,B1,CT3,HE1,HG5,Q1,QN1,QP1,RB5,RN1,S1,ST6

Moisture regime: mesic

Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 750 m

Slope: 0 - 50%

Aspect: all

Landscape position: normal to receiving, valley floor to middle slope

ECOLOGY

- succession to western hemlock is obvious, with hemlock well established in main tree canopy
- probably an average type for forest zone
- understories variable in density - the less shrubs, the more herbs

010-55	SR740219
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: young climatic climax

Stand appearance: open coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (30)	Pacific silver fir western hemlock	15 20		
Low shrub layer (40)	oval-leaved blueberry Pacific silver fir western hemlock	10 7 10	salmonberry red elderberry	10 3
Herb layer (90)	fireweed oak fern	50 30	American vanilla leaf foamflowers Pacific trailing blackberry	7 7 5
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
Pacific silver fir fireweed oak fern salmonberry	coast Douglas-fir mountain hemlock yellow cedar red huckleberry western thimbleberry western sword fern

TERRAIN AND SOILS

Terrain: morainal blanket
Soil Texture: medium
Soil Association comp: M11
Moisture regime: subhygric
Drainage: well

TOPOGRAPHY

Elevation: 675 m
Slope: 23%
Aspect: 45°
Landscape position: normal,
middle slope

ECOLOGY

- site has been logged and burned; natural regeneration is dense, with excellent stocking
- fireweed is now being outcompeted for light and space and will disappear soon
- rest of species on site were present before the disturbance occurred, some have increased in dominance with the increased light from tree canopy removal

010-56	Coast Douglas-fir - western hemlock - northern twinflower - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to overmature seral

Stand appearance: dense coniferous forest.

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	coast Douglas-fir western hemlock	20-60 5-50	western red cedar	5-15
Tall shrub layer (20)	western hemlock western red cedar	10 10	coast Douglas-fir	<5
Low shrub layer (90)	salal dull Oregon-grape western hemlock	30-80 10 5	red huckleberry western red cedar balhip rose	5-20 <5 varies
Herb layer (variable)	American vanilla leaf northern twinflower	varies 5-10	Pacific trailing blackberry western bracken common western pipsissewa	<5 varies <5
Moss, lichen and liverwort layer (80)	eurhynchium moss hylocomium moss	20-80 5-70		

CHARACTER SPECIES

Present	Absent
western hemlock baldhip rose American vanilla leaf northern twinflower	Pacific madrone red alder oceanspray grand fir

TERRAIN AND SOILS

Terrain: fluvio-glacial; moraine; colluvial blanket

Soil Texture: medium to coarse

Soil Association comp: B1,CT1,D1,HA1,HM1,QP1,RT1

Moisture regime: subhygric to mesic

Drainage: moderately well to well

TOPOGRAPHY

Elevation: 100 - 600 m

Slope: 0 - 15%

Aspect: all

Landscape position: shedding to normal, lower to upper slope

ECOLOGY

- highly variable, widespread vegetation type
- climatically, slightly moister than 010-57, as evidenced by lack of grand fir, oceanspray and Pacific madrone, and increase of western hemlock
- medium forestry capability for Douglas-fir

010-57	Coast Douglas-fir - western hemlock - oceanspray - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra, Malahat

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (80)	coast Douglas-fir	70	red alder western hemlock	10 <5
Tall shrub layer (20)	coast Douglas-fir western hemlock	10 5	western red cedar oceanspray grand fir	<5 varies <5
Low shrub layer (50)	salal western hemlock	10-80 <5	western red cedar dull Oregon-grape balduf rose	<5 7 5
Herb layer (20)	Pacific trailing blackberry western bracken	5 5	American vanilla leaf	5-20
Moss, lichen and liverwort layer (25)	eurhynchium moss	20	hylocomium moss	5

CHARACTER SPECIES

Present	Absent
oceanspray western hemlock grand fir	violets

TERRAIN AND SOILS

Terrain: fluvio-glacial; moraine; colluvial blanket
 Soil Texture: medium to coarse
 Soil Association comp: D1,D2,H1,HA2,KA1,Q1,QN1,R1,S1
 Moisture regime: mesic
 Drainage: well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 0 - 8%
 Aspect: all
 Landscape position: shedding to normal, lower to upper slope

ECOLOGY

- a little drier than 010-56, as evidenced by oceanspray, scattered Pacific madrone, and grand fir
- widespread, variable type with medium forest capability but low browse potential

010-58	Coast Douglas-fir - salal - American vanilla leaf - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous or mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (55)	coast Douglas-fir	50	red alder	5
Tall shrub layer (15)	coast Douglas-fir	5	western hemlock	5
Low shrub layer (80)	salal dull Oregon-grape	50 30	western hemlock red huckleberry baldhip rose	<5 5 <5
Herb layer (variable)	American vanilla leaf western bracken	10 3-50	Pacific trailing blackberry northern twinflower	5 <5
Moss, lichen and liverwort layer (35)	eurhynchium moss hylocomium moss	20 10		

CHARACTER SPECIES

Present	Absent
dull Oregon-grape western hemlock red alder baldhip rose	western sword fern Pacific silver fir devil's-club grand fir

TERRAIN AND SOILS

Terrain: fluvial; marine
 Soil Texture: coarse
 Soil Association comp: A1,B1,CA1,HA1,HM1,KY1,Q1,Q3
 Moisture regime: mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 100 - 300 m
 Slope: 0 - 10%
 Aspect: all
 Landscape position: normal to
 shedding, lower to middle slopes

ECOLOGY

- drier than 010-59, as evident from lack of grand fir and western sword fern
- moisture holding capacity and nutrient availability lower because of coarse texture of materials
- forestry capability is medium
- type is quite variable due to extensive past disturbances

010-59

Coast Douglas-fir - dull Oregon-grape - western sword fern - moss

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous or mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	coast Douglas-fir	60	red alder	20
Tall shrub layer (15)			western hemlock western red cedar coast Douglas-fir	5 <5 5
Low shrub layer (variable)	salal dull Oregon-grape	10 5-50	western hemlock	<5
Herb layer (60)	western sword fern American vanilla leaf western bracken	5-60 15-60 5-10	northern twinflower broad-leaved starflower Pacific trailing blackberry	5 <5 5
Moss, lichen and liverwort layer (25)	eurhynchium moss	20	hylocomium moss	5

CHARACTER SPECIES

Present	Absent
western sword fern western hemlock hylocomium moss red alder	Pacific silver fir devil's club

TERRAIN AND SOILS

Terrain: colluvium; moraine; fluvial
 Soil Texture: medium to coarse
 Soil Association comp: B1,CT1,D1,HA1,HA2,HM2,HL1,Q3,RA1,RN4,S1
 Moisture regime: hygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 500 m
 Slope: 0 - 20%
 Aspect: all
 Landscape position: receiving to normal, lower to middle slope

ECOLOGY

- similar to 010-58 but wetter, with better moisture holding capacity and added nutrient input from upslope, evident from presence of western sword fern

010-60

SR750143

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: yellow cedar subzone

Successional stage: maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (70)	western hemlock coast Douglas-fir	30 35	Pacific silver fir	15
Tall shrub layer (15)	western hemlock	10	Pacific silver fir	5
Low shrub layer (15)	devil's-club western hemlock	5 5	Pacific silver fir baldhip rose salmonberry	3 2 2
Herb layer (90)	American vanilla leaf western sword fern oak fern	60 15 20	trifoliolate-leaved foamflower trailplant fescues	15 7 5
Moss, lichen and liverwort layer (15)	hylocomium moss	5	anion mosses rhytidiadelphus loreus moss	3 3

CHARACTER SPECIES

Present	Absent
coast Douglas-fir salmonberry baldhip rose devil's-club fescues Pacific silver fir	western red cedar oval-leaved blueberry deer fern common lady fern

TERRAIN AND SOILS

Terrain: fluvial
Soil Texture: sandy
Soil Association comp: E12
Moisture regime: mesic
Drainage: well

TOPOGRAPHY

Elevation: 300 m
Slope: 0°
Aspect: all
Landscape position: valley floor

ECOLOGY

- coarse textured site has characteristics of both a receiving site and a site with very dry microsites
- is receiving cold air drainage in narrow river valley
- other possibly similar sites have been logged (eg. lower Adam River)

010-61	Salal - oval-leaved blueberry - northern twinflower - fireweed
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young seral
 Stand appearance: recently logged

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (40)	western hemlock coast Douglas-fir	15 varies	western red cedar	10
Low shrub layer (70)	red huckleberry oval-leaved blueberry salal	20 15 20	western hemlock western red cedar coast Douglas-fir	5-50 10 5
Herb layer (20)	northern twinflower fireweed	7 3	Canadian bunchberry	<5
Moss, lichen and liverwort layer (5)			hylocomium moss	5

CHARACTER SPECIES

Present	Absent
oval-leaved blueberry fireweed western yew	baldhip rose

TERRAIN AND SOILS

Terrain: moraine; fluvio-glacial
 Soil Texture: medium to coarse
 Soil Association comp: HMI, QP1
 Moisture regime: submesic to mesic
 Drainage: well

TOPOGRAPHY

Elevation: 0 - 600 m
 Slope: 0 - 30%
 Aspect: all
 Landscape position: normal to
 shedding, lower slope to apex

ECOLOGY

- type found in climatically moister area than 010-63, as evidenced by western yew and oval-leaved blueberry and absence of baldhip rose
- most coast Douglas-fir has been planted after logging and slash burning
- pioneer herbs disappearing as existing forest species recover in abundance

SR740244

VEGETATION CHARACTERISTICS

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: pioneer seral

Stand appearance: pioneer shrub

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (0)				
Tall shrub layer (30)	willows red alder western red-osier dogwood	10 10 15		
Low shrub layer (90)	hardhack salmonberry salal	85 10 10	Nootka rose Sitka spruce	5 5
Herb layer (30)	bracken	7		
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
red alder red-osier dogwood salmonberry hardhack	western hemlock black cottonwood bigleaf maple

TERRAIN AND SOILS

Terrain: marine
Soil Texture: coarse
Soil Association comp: B2
Moisture regime: hygric
Drainage: imperfect

TOPOGRAPHY

Elevation: 100 m
Slope: 3%
Aspect: 270°
Landscape position: normal;
coastal plain

ECOLOGY

- logged fluvial site, where shrubs have dominated after the disturbance, preventing establishment of coniferous species
- water table high for much of the year

010-63

Salal - western bracken - fireweed

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra; Malahat

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young seral

Stand appearance: logged regenerating forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0-10)			coast Douglas-fir	varies
Tall shrub layer (25)	western hemlock coast Douglas-fir	5 20	western red cedar	<5
Low shrub layer (60)	salal dull Oregon-grape coast Douglas-fir	20-70 5 5	red huckleberry baldhip rose western red cedar	5 <5 5
Herb layer (40)	western bracken Pacific trailing blackberry fireweed	30 5 5	American vanilla leaf common pearly everlasting violets	<5 <5 <5
Moss, lichen and liverwort layer (<5)			polytrichum moss	<5

CHARACTER SPECIES

Present	Absent
western red cedar baldhip rose violets	oval-leaved blueberry deer fern coastal American red elder common lady fern red alder (tree layer)

TERRAIN AND SOILS

Terrain: colluvium; moraine
 Soil Texture: fine to coarse
 Soil Association comp: QN1, QN4, QP1, RB6, RT6, ST6
 Moisture regime: mesic
 Drainage: well to rapid

TOPOGRAPHY

Elevation: 100 - 700 m
 Slope: 0 - 15%
 Aspect: all
 Landscape position: shedding, lower to upper slope

ECOLOGY

- recently logged and often burned sites, usually replanted to coast Douglas-fir, with natural western hemlock regeneration
- sites variable, sometimes dominated by existing forest shrubs, but few pioneering herbs left

Successional stage: maturing seral to mature edaphic climax
Stand appearance: open to dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (variable)	coast Douglas-fir lodgepole pine	5 varies		
Tall shrub layer (<5)	coast Douglas-fir	<5	oceanspray	<5
Low shrub layer (80)	salal dull Oregon-grape	75 15	common snowberry	<5
Herb layer (10)			selaginella western bracken	<5 <5
Moss, lichen and liverwort layer (50)	rhacomitrium moss eurhynchium moss	5 50		

CHARACTER SPECIES

Present	Absent
rhacomitrium moss selaginella lodgepole pine	western hemlock Pacific madrone

TERRAIN AND SOILS

Terrain: colluvial veneer to rock outcrops
Soil Texture: gravelly sandy loam
Soil Association comp: CE1,HL6,RO,RS6,RT1,SL6,SP6
Moisture regime: xeric
Drainage: rapid

TOPOGRAPHY

Elevation: 0 - 500 m
Slope: 5 - 45%
Aspect: all
Landscape position: shedding to
normal, middle slope to apex

ECOLOGY

- dry, shallow type, subject to summer drought; generally nutrient poor, with low moisture holding capacity
- tree regeneration very slow

010-65

SR750021

VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature edaphic climax

Stand appearance: pioneer herb

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (0)				
Low shrub layer (20)	western hemlock western red cedar devil's-club	7 7 5	western thimbleberry salmonberry	3 3
Herb layer (95)	northern maidenhair fern wall-lettuce foamflower	85 10 10	oak fern common lady fern	5 5
Moss, lichen and liverwort layer (30)	hylocomium moss rhytidiadelphus loreus moss	10 15		

CHARACTER SPECIES

Present	Absent
salmonberry northern maidenhair fern wall-lettuce	western hemlock (tree layer) salal Pacific silver fir deer fern

TERRAIN AND SOILS

Terrain: colluvial veneer
Soil Texture: medium
Soil Association comp: HQ6
Moisture regime: subhygric
Drainage: moderately well

TOPOGRAPHY

Elevation: 365 m
Slope: 50%
Aspect: 45°
Landscape position: receiving seepage,
middle slope

ECOLOGY

- rock outcropping, with little capability for tree production,
dominated by mosses and ferns

010-66	Coast Douglas-fir - salal - northern twinflower
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: mature edaphic climax
 Stand appearance: open coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (20)	coast Douglas-fir	15	western red cedar western hemlock	<5 <5
Tall shrub layer (20)	coast Douglas-fir	15	western hemlock western red cedar	<5 <5
Low shrub layer (variable)	salal dull Oregon-grape	5-30 10	red huckleberry oceanspray baldhip rose	<5 <5 <5
Herb layer (30)	northern twinflower	5-30	hawkweed fescue grass American vanilla leaf	<5 <5 <5
Moss, lichen and liverwort layer (15)			rhacomitrium moss dicranum moss hylocomium moss	10 <5 <5

CHARACTER SPECIES

Present	Absent
rhacomitrium moss western hemlock oceanspray	Pacific madrone lodgepole pine

TERRAIN AND SOILS

Terrain: colluvial veneer
 Soil Texture: medium to coarse
 Soil Association comp: PT6,RL6,RT6
 Moisture regime: mesic to subxeric
 Drainage: rapid

TOPOGRAPHY

Elevation: 200 - 700 m
 Slope: 10 - 30%
 Aspect: all
 Landscape position: shedding, upper slope

ECOLOGY

- dry, shallow sites in moister subzone, evidenced by lack of Pacific madrone
- low forest capability, with open forest and shrub canopies allowing variety of herbaceous growth, including several species indicating disturbance

010-67	Coast Douglas-fir - lodgepole pine - western bracken - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Malahat; Quadra
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to overmature seral
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	coast Douglas-fir lodgepole pine	10-80 varies		
Tall shrub layer (20)	coast Douglas-fir	5-20		
Low shrub layer (80)	salal dull Oregon-grape	60 15		
Herb layer (10)	western bracken	5	large-leaved rattlesnake orchid pipsissewas	<5 <5
Moss, lichen and liverwort layer (40)	eurhynchium moss	40		

CHARACTER SPECIES

Present	Absent
lodgepole pine	western hemlock Pacific madrone rhacomitrium moss selaginella

TERRAIN AND SOILS

Terrain: fluvial; fluvioglacial
 Soil Texture: gravelly sandy loam
 Soil Association comp: Q1,Q3,HA2,HA7,QU3
 Moisture regime: xeric to submesic
 Drainage: rapid

TOPOGRAPHY

Elevation: 30 - 150 m
 Slope: 0%
 Aspect: all
 Landscape position: normal, lower
 slope to plain

ECOLOGY

- nutrient poor, with low moisture holding capacity
- subject to summer drought
- tree growth slow, leading probably to an edaphic climax of coast Douglas-fir

010-68	Coast Douglas-fir - Pacific madrone- bristly manzanita
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat; Quadra

Zone/Subzone: Coastal grand fir - western red cedar zone

Coastal western hemlock zone: coast Douglas-fir subzone (and occasionally western hemlock subzone)

Successional stage: mature edaphic climax

Stand appearance: open to dense mixed forest.

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (variable)	Pacific madrone coast Douglas-fir	varies varies		
Tall shrub layer (20)	Pacific madrone	15	coast Douglas-fir	10
Low shrub layer (20-60)	bristly manzanita salal dull Oregon-grape	5 10-40 10	baldhip rose	5
Herb layer (variable)			western fescue kinnikinnick	1-5 varies
Moss, lichen and liverwort layer (variable)	rhacomitrium moss	5-30	eurhynchium moss	varies

CHARACTER SPECIES

Present	Absent
bristly manzanita salal	Garry oak western hemlock

TERRAIN AND SOILS

Terrain: colluvial veneer to rock outcrop
Soil Texture: medium to coarse
Soil Association comp: HL6,KY1,RB6,RO,RT6,SP2,TM6
Moisture regime: submesic to xeric
Drainage: well to rapid

TOPOGRAPHY

Elevation: 0 - 500 m
Slope: 10 - 50%
Aspect: southeast to southwest
Landscape position: shedding, middle
to upper slope

ECOLOGY

- moister than sites with Garry oak
- very variable herbaceous component
- on drier-than-average sites, with additional heat units due to aspect

010-69

Garry Oak - early hair grass

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat; Quadra

Zone/Subzone: Coastal grand fir - western red cedar zone

Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage:

Stand appearance:

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (30)	coast Douglas-fir Garry oak	10 5-20	Pacific madrone	10
Tall shrub layer (15)	Garry oak coast Douglas-fir	7 5	Pacific madrone	10
Low shrub layer (5)			oceanspray dull Oregon-grape western trumpet honeysuckle	5 <5 varies
Herb layer (60-90)	early hair grass common cleavers common yarrow blue grass	5-40 <5 5 varies	selaginella common camas rosy plectritis	15 varies <5
Moss, lichen and liverwort layer (variable)	racomitrium moss	varies		

CHARACTER SPECIES

Present	Absent
Garry oak common camas rosy plectritis	western hemlock salal

TERRAIN AND SOILS

Terrain: colluvial veneer: rock outcrops
Soil Texture: medium to coarse
Soil Association comp: HL6,RL6,RO,RT6,TM6

Moisture regime: submesic to xeric
Drainage: rapid

TOPOGRAPHY

Elevation: 0 - 200 m
Slope: 0 - 15%
Aspect: all
Landscape position: shedding, middle slope to apex

ECOLOGY

- early flowering sites due to shallowness of soil and extreme summer drought

010-70	Coast Douglas-fir - Pacific madrone - western bracken - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat; Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to maturing seral

Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	coast Douglas-fir Pacific madrone	60 10		
Tall shrub layer (variable)	coast Douglas-fir oceanspray	15 5	Pacific madrone	varies
Low shrub layer (90)	red huckleberry salal dull Oregon-grape	5 80 varies	baldhip rose oceanspray	7 <5
Herb layer (20)	Pacific trailing blackberry western bracken	10 10	broad-leaved starflower American vanilla leaf	<5 <5
Moss, lichen and liverwort layer (variable)	eurhynchium moss	varies		

CHARACTER SPECIES

Present	Absent
Pacific madrone red huckleberry	lodgepole pine rhacomitrium moss evergreen huckleberry

TERRAIN AND SOILS

Terrain: fluvio-glacial; morainal blanket
Soil Texture: medium to coarse
Soil Association comp: BL1,D2,HM2,S3,S7

Moisture regime: mesic
Drainage: well to rapid

TOPOGRAPHY

Elevation: 100 - 700 m
Slope: 0 - 15%
Aspect: southeast to southwest
Landscape position: shedding, middle slope

ECOLOGY

- unusual type with Pacific madrone as seral tree on deep sites
- dense low shrub layer will inhibit tree regeneration and herb establishment

010-71	SR74076E
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Malahat
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: mature edaphic climax
 Stand appearance: wetland

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (8)			red alder western red cedar	5 2
Tall shrub layer (40)	willows red alder	25 15		
Low shrub layer (10)			willows	5
Herb layer (100)	American skunk cabbage sedges	40 60	bulrushes tufted hair grass	5 10
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
American skunk cabbage sedges bulrushes tufted hair grass	coast Douglas-fir western hemlock salal

TERRAIN AND SOILS

Terrain: organic blanket
 Soil Texture:
 Soil Association comp: AR1
 Moisture regime: subhydric
 Drainage: poor

TOPOGRAPHY

Elevation: 365 m
 Slope: 0°
 Aspect: all
 Landscape position: collecting;
 depression

ECOLOGY

- high water table for most of the year
- collecting area from surrounding morainal plain
- organic accumulation exceeds decomposition

010-72	Big-headed sedge - yellow sand-verbena
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Malahat; Nootka; Hecate
 Zone/Subzone: Coastal grand fir - western red cedar zone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
 Coastal western hemlock - western red cedar zone
 Successional stage: maturing edaphic climax
 Stand appearance: pioneer herbaceous

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (0)				
Tall shrub layer (0)				
Low shrub layer (<5)			Sitka spruce salal	<5 <5
Herb layer (variable)	big-headed sedge dune wild rye grass European beach grass	varies varies varies	kinnikinnick gray beach peavine yellow sand-verbena	varies <5 varies
Moss, lichen and liverwort layer (<5)			fruticose lichens dicranum moss	varies <5

CHARACTER SPECIES

Present	Absent
big-headed sedge European beach grass gray beach peavine yellow sand-verbena American glehnia	seabeach sandwort Pacific silverweed glasswort Arctic rush Lyngbye's sedge

TERRAIN AND SOILS

Terrain: eolian sand dunes
 Soil Texture: sandy
 Soil Association comp: NT7,V10
 Moisture regime: submesic
 Drainage: rapidly drained

TOPOGRAPHY

Elevation: 3 - 6 m
 Slope: 0 - 15%
 Aspect: southwest
 Landscape position: lower slope

ECOLOGY

- variable vegetation established in a shifting sand dune area, range of site stabilities, with stability easily upset by removal of or damage to vegetative cover
- low moisture holding capacity

010-73	Tufted hair grass - Lyngbye's sedge vegetation type
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Malahat; Quadra; Nootka
 Zone/Subzone: Coastal grand fir - western red cedar zone
 Coastal western hemlock zone: coast Douglas-fir subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
 Successional stage: mature edaphic climax
 Stand appearance: herbaceous meadow

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (<5)			Pacific crab apple Sitka spruce red alder	<5 <5 <5
Low shrub layer (<5)			twinberry honeysuckle Nootka rose salal	<5 <5
Herb layer (90)	Arctic rush Lyngbye's sedge Pacific silverweed tufted hair grass	5 35 10-40 10-60	springbank clover sea-milkwort glasswort western lilaepsis	5 <5 5-20 <5
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
Arctic rush Lyngbye's sedge Pacific silverweed sea plantain Alaska plantain springbank clover	sea-milkwort glasswort western lilaepsis coast Douglas-fir hardhack sweet gale

TERRAIN AND SOILS

Terrain: marine
 Soil Texture: silt to sand
 Soil Association comp: AT7, CP9, HH, SW9, T01
 Moisture regime: hydric
 Drainage: moderately well to poor

TOPOGRAPHY

Elevation: 1 - 5 m
 Slope: 0%
 Aspect: level
 Landscape position: shorelines along salt water bodies

ECOLOGY

- vegetative cover and composition very strongly related to frequency and concentration of salt water inundation
- vegetation tends to form "bands" of species from open mud to high water line
- plants generally very salt tolerant

010-74	Red alder - grasses
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young seral
 Stand appearance: open deciduous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (5)			red alder	5
Tall shrub layer (65)	red alder	60	coast Douglas-fir	<5
Low shrub layer (10)	red alder	5	coast Douglas-fir willows	5 <5
Herb layer (75)	bluegrasses wall-lettuce Pacific trailing blackberry	15 30 10	Yorkshire fog wild strawberries wild rye grasses	10 7 varies
Moss, lichen and liverwort layer (<5)	rhacomitrium moss	<5		

CHARACTER SPECIES

Present	Absent
red alder Pacific trailing blackberry wall-lettuce wild rye grasses Yorkshire fog	Pacific silver fir fireweed oceanspray common lady fern

TERRAIN AND SOILS

Terrain: moraine; fluvio-glacial
 Soil Texture: medium
 Soil Association comp: HM1, RN1
 Moisture regime: mesic
 Drainage: well to rapid

TOPOGRAPHY

Elevation. 0 - 400 m
 Slope: 0 - 20%
 Aspect: all
 Landscape position: normal, middle slope

ECOLOGY

- type found on seriously disturbed sites where mineral soils had been exposed
- initial rapid growth of red alder, with slow invasion of coniferous regeneration
- grasses predominate groundcover, preventing much surface erosion
- lacks general dense shrub cover found under red alder on floodplain sites

010-75

SR740270

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: mature edaphic climax

Stand appearance: treed wetland

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (30)	western red cedar western hemlock	20 15		
Tall shrub layer (25)	western hemlock	20	western red cedar	5
Low shrub layer (50)	western hemlock salal	15 35	salmonberry Pacific rusty menziesia	5 7
Herb layer (85)	common lady fern American skunk cabbage sedges	50 10 15	Canadian bunchberry trifoliolate-leaved foamflower bracken	10 7 5
Moss, lichen and liverwort layer (5)			minium mosses	5

CHARACTER SPECIES

Present	Absent
western red cedar common lady fern American skunk cabbage sedges	Sitka spruce coast Douglas-fir oval-leaved blueberry western red-osier dogwood

TERRAIN AND SOILS

Terrain: fluvial
Soil Texture: fine
Soil Association comp: KT7
Moisture regime: hygric
Drainage: poor

TOPOGRAPHY

Elevation: 290 m
Slope: 0%
Aspect: level
Landscape position: collecting,
depression

ECOLOGY

- seepage collecting area, dominated by western red cedar
- good tree productivity, with no moisture stress in growing season

010-76	Coast Douglas-fir - fireweed - common pearly everlasting
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Malahat; Quadra, Nootka
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone and yellow cedar subzone
 Successional stage: young seral
 Stand appearance: recently logged

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (<5)				
Low shrub layer (5)	coast Douglas-fir	5	western thimbleberry coastal American red elder red huckleberry	<5 <5 3-10
Herb layer (60)	fireweed common pearly everlasting American vanilla leaf	10-90 10 5	violets foamflower	3 5
Moss, lichen and liverwort layer (<5)			polytrichum moss	<5

CHARACTER SPECIES

Present	Absent
common pearly everlasting fireweed western thimbleberry violets	western hemlock (tree layer or tall shrub layer) baldhip rose western flowering dogwood

TERRAIN AND SOILS

Terrain: moraine; colluvium
 Soil Texture: fine to coarse
 Soil Association comp: CL1, GL1, GT1, K11, N11, QP1, RT1, ST1
 Moisture regime: subhygric to mesic
 Drainage: well to rapid

TOPOGRAPHY

Elevation: 400 - 1000 m
 Slope: 15 - 70%
 Aspect: all
 Landscape position: shedding to normal, lower to upper slope

ECOLOGY

- very recently logged and burned sites, replanted with coast Douglas-fir
- sites are dominated by pioneer herbs such as fireweed and common pearly everlasting and little competition among species is yet evident
- very variable sites have a similar initial response to logging and burning, since most forest floor humus has been removed

010-77	Red alder - western hemlock - deer fern - fireweed
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VEGETATION CHARACTERISTICS

Region: Outer Coastal Section: Nootka
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone:

Successional stage: young seral
 Stand appearance: recently logged

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (variable)	red alder coast Douglas-fir (planted)	5-30 10-60		
Low shrub layer (70)	red huckleberry western hemlock salmonberry	5-20 5 20	coast Douglas-fir (planted) salal western red cedar	5-50 30 5
Herb layer (70)	fireweed deer fern	40 5-40	common pearly everlasting wall-lettuce	<5 <5
Moss, lichen and liverwort layer (5)	polytrichum moss	5		

CHARACTER SPECIES

Present	Absent
red alder salmonberry fireweed deer fern	Canadian bunchberry northern twinflower Pacific silver fir (tree layer)

TERRAIN AND SOILS

Terrain: marine; colluvium; moraine
 Soil Texture: fine to coarse
 Soil Association comp: HP8, KL3, K01, RS2, SR1
 Moisture regime: subhygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 0 - 60%
 Aspect: southeast to southwest
 Landscape position: receiving to normal, lower to middle slope

ECOLOGY

- variable type, occurs after logging and slash burning
- all coast Douglas-fir planted; western hemlock/Pacific silver fir regeneration natural
- sites dominated by shrubs that survived logging activities and pioneering herbs such as fireweed

010-78

Western hemlock - Pacific silver fir - fireweed

VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra, Nootka
 Zone/Subzone: Coastal western hemlock - Pacific silver fir zone.
 western red cedar subzone and yellow cedar subzone

Successional stage: young seral
 Stand appearance: recently logged

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (0)				
Tall shrub layer (variable)	western hemlock coast Douglas-fir (planted)	10 varies	Pacific silver fir	10
Low shrub layer (50)	western hemlock coast Douglas-fir (planted) salal	5 10 varies	red huckleberry blueberry Pacific silver fir	5 20 <5
Herb layer (variable)	fireweed common pearly everlasting	30 5-10	Canadian bunchberry northern twinflower deer fern	5 5 5
Moss, lichen and liverwort layer (5)			polytrichum moss	5

CHARACTER SPECIES

Present	Absent
Pacific silver fir (regeneration) blueberry Canadian bunchberry northern twinflower fireweed	red alder

TERRAIN AND SOILS

Terrain: fluvial; colluvium; moraine
 Soil Texture: coarse
 Soil Association comp: CT1,GR1,HP8,HI1,NI6,RD1,UC4

Moisture regime: hygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 900 m
 Slope: 0 - 50%
 Aspect: all
 Landscape position: receiving to normal, valley floor to apex

ECOLOGY

- highly variable, sometimes lacking regenerating coniferous tree species
- all coast Douglas-fir has been planted after the logging and burning
- only shallow forest floor humus remaining, with some mineral soil exposure

010-79	SR740062
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Quadra
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young seral
 Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (10)			coast Douglas-fir bitter cherry	5 5
Tall shrub layer (70)	bitter cherry	65	coast Douglas-fir	10
Low shrub layer (25)	red-flowering currant	15	coast Douglas-fir	7
Herb layer (80)	western bracken peavines American vanilla leaf	20 25 10	Sitka columbine	10
Moss, lichen and liverwort layer (10)	racomitrium mosses	5		

CHARACTER SPECIES

Present	Absent
bitter cherry coast Douglas-fir red-flowering currant peavines bracken	western hemlock salal Pacific madrone lodgepole pine

TERRAIN AND SOILS

Terrain: colluvial veneer
 Soil Texture: medium
 Soil Association comp: RT1
 Moisture regime: mesic
 Drainage: well

TOPOGRAPHY

Elevation: 420 m
 Slope: 45%
 Aspect: 180°
 Landscape position: normal;
 middle slope

ECOLOGY

- logged and burned site, with some Douglas-fir planting
- south-facing slope results in growing season moisture stress
- uncommon vegetation

010-80

Coast Douglas-fir - devil's-club - western sword fern

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to overmature seral

Stand appearance: dense coniferous or mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (80)	western hemlock coast Douglas-fir	15 10-60	red alder	5
Tall shrub layer (10)	western hemlock	10		
Low shrub layer (10)	western hemlock	5	devil's-club	<5
Herb layer (70)	western sword fern American vanilla leaf foamflowers	5-60 5-60 5	wall-lettuce	<5
Moss, lichen and liverwort layer (5)			eurhynchium moss	5

CHARACTER SPECIES

Present	Absent
devil's-club foamflowers western hemlock (tree layer)	grand fir

TERRAIN AND SOILS

Terrain: moraine; colluvium; fluvial
 Soil Texture: fine to coarse
 Soil Association comp: CL8,CT1,HM1,KT1,QN1,QP1,RB1

Moisture regime: hygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 5 - 60%
 Aspect: all
 Landscape position: receiving, lower to middle slope

ECOLOGY

- moister than average, with good nutrient availability
- forest capability medium to high
- rich herbaceous layers, with open shrub understory

010-81	Coast Douglas-fir - Sitka spruce - western sword fern - moss
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra; Nootka
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: maturing seral to mature edaphic climax
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (variable)	coast Douglas-fir Sitka spruce	varies 20	red alder western hemlock	20 30
Tall shrub layer (20)	western hemlock Sitka spruce	10 5		
Low shrub layer (5)			salmonberry western hemlock red huckleberry Sitka spruce	varies <5 <5 <5
Herb layer (variable)	western sword fern foamflower trailplant	5-30 5 <5	buttercups wall-lettuce broad-leaved starflower	<5 <5 <5
Moss, lichen and liverwort layer (20)	hylocomium moss rhytidiadelphus loreus moss	10 10	mnium moss leucolepis moss	5 10

CHARACTER SPECIES

Present	Absent
Sitka spruce western sword fern foamflowers rhytidiadelphus loreus moss	devil's-club salal dull Oregon-grape northern twinflower western bracken

TERRAIN AND SOILS

Terrain: fluvial
 Soil Texture: coarse
 Soil Association comp: HH1, HM2, KA1, KT8
 Moisture regime: hygric to mesic
 Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 250 m
 Slope: 0 - 5%
 Aspect: all
 Landscape position: receiving, valley floor

ECOLOGY

- floodplain vegetation site, with mature coniferous tree canopy, expected to result in an edaphic Sitka spruce - western hemlock climax
- high forestry capability
- level sites and open understory allows easy ground passage by people and animals

010-82

Red alder - western hemlock - western sword fern - moss

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to maturing seral

Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (75)	red alder western red cedar western hemlock	5-20 5-30 10	coast Douglas-fir bigleaf maple	15 10
Tall shrub layer (20)	western hemlock western red cedar	10 10	grand fir coast Douglas-fir	5 <5
Low shrub layer (5)	red huckleberry	5	western hemlock	<5
Herb layer (80)	western sword fern	70	western white trillium trailplant American vanilla leaf	<5 <5 5
Moss, lichen and liverwort layer (20)	mnium moss leucolepis moss hylocomium moss	10 7 5	eurhynchium moss	5

CHARACTER SPECIES

Present	Absent
western white trillium western hemlock red alder western sword fern	Sitka spruce sedge northern twinflower western bracken

TERRAIN AND SOILS

Terrain: fluvial
Soil Texture: coarse
Soil Association comp: CA4,CA7,CH1,HA1,HM1,RB6

Moisture regime: subhygric to mesic
Drainage: imperfect to well

TOPOGRAPHY

Elevation: 0 - 200 m
Slope: 0 - 10%
Aspect: all
Landscape position: receiving, lower slope to valley floor

ECOLOGY

- similar type to 010-96 and 010-90 except this type has more diverse and more advanced coniferous regeneration
- moderate to high forestry capability
- dominance by ferns seems to increase with stand age, as tree canopy becomes more diverse in structure

010-83

Black cottonwood - common red-osier dogwood - common lady fern

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young seral, mature edaphic climax

Stand appearance: dense mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (50)	black cottonwood red alder	30 30	western hemlock coast Douglas-fir	5 10
Tall shrub layer (10)	common red-osier dogwood Rocky Mountain maple	5 5		
Low shrub layer (40)	salmonberry	15	devil's-club	20
Herb layer (75)	common lady fern American vanilla leaf foamflower	60 5 5	western sword fern	<5
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
Rocky Mountain maple black cottonwood common red-osier dogwood	deer fern American skunk cabbage Sitka spruce

TERRAIN AND SOILS

Terrain: fluvial level; fluvial fan
Soil Texture: medium to coarse
Soil Association comp: CH1, HM8y

Moisture regime: hygric
Drainage: well

TOPOGRAPHY

Elevation: 0 - 150 m
Slope: 0%
Aspect: northwest to northeast
Landscape position: receiving, lower slope to valley floor

ECOLOGY

- uncommon type due to extensive floodplain disturbances
- varied amount of coniferous regeneration, depending on flood frequency, shrub competition, and/or seed source
- good forestry capability, with reasonable nutrient availability and good moisture availability

010-84	Red alder - salmonberry - skunk cabbage
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra, Nootka
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: young seral
 Stand appearance: dense mixed or deciduous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	red alder	80		
Tall shrub layer (f20)	red alder	20	western red cedar devil's-club	<5 5
Low shrub layer (60)	salmonberry	1-60	red huckleberry	<5
Herb layer (90)	American skunk-cabbage common lady fern	30 10	western sword fern horsetails field mint	5 <5 <5
Moss, lichen and liverwort layer (5)	mnium moss	5		

CHARACTER SPECIES

Present	Absent
American skunk cabbage red alder field mint salmonberry common lady fern	salal Sitka spruce

TERRAIN AND SOILS

Terrain: fluvial; marine
 Soil Texture: fine to coarse
 Soil Association comp: B1,CH7,EAl,KL1,PA1,Q3
 Moisture regime: hygric to hydric
 Drainage: imperfect to poor

TOPOGRAPHY

Elevation: 0 - 300 m
 Slope: 0 - 2%
 Aspect: all
 Landscape position: receiving to
 collecting, lower slope to valley
 floor

ECOLOGY

- highly variable type but always with American skunk cabbage, indicating presence of high water table and poor drainage
- poor soil aeration and reduced nutrient availability; lowered forest capability; western red cedar is favoured coniferous regeneration

010-85

SR74047E

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat

Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young seral

Stand appearance: dense deciduous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (35)	red alder willows	25 20	black cottonwood	5
Tall shrub layer (60)	Pacific ninebark	50	western thimbleberry coastal American red elder	5 10
Low shrub layer (10)			Pacific ninebark	10
Herb layer (95)	palmate colt's-foot sweet-scented bedstraw western bracken	75 10 15	Cooley's hedge-nettle horsetails orchard grass	5 5 5
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
palmate colt's-foot red alder black cottonwood Pacific ninebark	western red-osier dogwood salal deer fern

TERRAIN AND SOILS

Terrain: fluvio-glacial
Soil Texture: coarse
Soil Association comp: HM8
Moisture regime: subhygric
Drainage: moderately well

TOPOGRAPHY

Elevation: 120°
Slope: 0°
Aspect: level
Landscape position: receiving,
valley floor

ECOLOGY

- wetter-than-average fluvial site; disturbance have led to a diverse tree canopy
- wetness encourages dense shrub thickets
- probably subject to periodic flooding
- coniferous tree establishment is very slow due to intense deciduous competition

010-86

Coast Douglas-fir - dull Oregon-grape - western bracken

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: young to maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (75)	coast Douglas-fir	75	bigleaf maple	<5
Tall shrub layer (20)	western hemlock	20		
Low shrub layer (45)	dull Oregon-grape red huckleberry salal	25 10 10	western hemlock oval-leaved blueberry baldhip rose	<5 <5 <5
Herb layer (50)	American vanilla leaf western bracken	15 20	broad-leaved starflower northern twinflower Pacific trailing blackberry	<5 5 <5
Moss, lichen and liverwort layer (75)	eurhynchium moss	10	hylocomium moss	<5

CHARACTER SPECIES

Present	Absent
western hemlock baldhip rose coast Douglas-fir dull Oregon-grape	western sword fern oceanspray western red cedar

TERRAIN AND SOILS

Terrain: marine; moraine
Soil Texture: fine to coarse
Soil Association comp: B1,D1,RA1
Moisture regime: subhygric to mesic
Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 150 m
Slope: 0 - 5%
Aspect: all
Landscape position: normal, valley floor to middle slope

ECOLOGY

- quite variable vegetation type, having been heavily disturbed by past land use history; quite similar to 010-56
- presence of good western hemlock regeneration indicates improving moisture availability (climatic)

010-87 Red alder - devil's-club - western sword fern

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to overmature seral

Stand appearance: dense deciduous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (85)	red alder bigleaf maple	80 10	western red cedar coast Douglas-fir	<5 <5
Tall shrub layer (5)	salmonberry	5	devil's-club	5
Low shrub layer (65)	devil's-club salmonberry	60 5	red huckleberry	<5
Herb layer (50)	western sword fern common lady fern foamflowers	30 5 5	green false hellebore western white trillium bedstraw	<5 <5 <5
Moss, lichen and liverwort layer (5)	mnium moss	5		

CHARACTER SPECIES

Present	Absent
green false hellebore devil's-club bigleaf maple	American skunk-cabbage deer fern

TERRAIN AND SOILS

Terrain: fluvial
 Soil Texture: medium to coarse
 Soil Association comp: CA1,HA1,HM1,KT1,KT7,QP1
 Moisture regime: hygric to subhygric
 Drainage: imperfect to well

TOPOGRAPHY

Elevation: 0 - 400 m
 Slope: 0 - 10%
 Aspect: all
 Landscape position: receiving, lower slope to valley floor

ECOLOGY

- enriched sites from down slope movement of moisture and nutrients
- site has been severely disturbed prior to establishment of red alder and maple
- may be subject to periodic flooding
- high forest capability

010-89

Sitka spruce - salmonberry - western sword fern

VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature edaphic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	Sitka spruce	60	red alder	varies
Tall shrub layer (5)	salmonberry	5	Sitka spruce	<5
Low shrub layer (variable)	salmonberry	varies	salal	5
Herb layer (60)	western sword fern two-leaved false Solomon's-seal	50 5-40	deer fern	<5
Moss, lichen and liverwort layer (5)			eurhynchium moss mnium moss	<5 <5

CHARACTER SPECIES

Present	Absent
Sitka spruce red alder deer fern	leucolepis moss rhytiadelphus moss palmate colt's-foot coastal American red elder

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: medium to coarse
Soil Association comp: KL4,NT7,SG1
Moisture regime: hygric
Drainage: imperfect to moderately well

TOPOGRAPHY

Elevation: 0 - 30 m
Slope: 0 - 15%
Aspect: all
Landscape position: receiving, lower slope

ECOLOGY

- variable type located on seepage areas near outer coast
- water table may be above surface for part of year, usually evidenced by sedges
- understory usually dense and impassible without trails
- very productive sites for tree growth

010-90	Red alder - bigleaf maple - western sword fern
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: young to maturing seral

Stand appearance: dense deciduous or mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (50-80)	red alder bigleaf maple	60 5	coast Douglas-fir	20
Tall shrub layer (<5)			coastal American red elder	<5
Low shrub layer (<5)			red huckleberry	<5
Herb layer (90)	western sword fern American vanilla leaf wall-lettuce	60 20 5	western bracken western white trillium Siberian spring beauty	5-60 <5 <5
Moss, lichen and liverwort layer (<5)	mnium moss	<5	eurhynchium moss	<5

CHARACTER SPECIES

Present	Absent
red alder western sword fern western white tillium	American skunk-cabbage devil's-club

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: fine to coarse
Soil Association comp: B1,KE1,Q3,T1

Moisture regime: subhygric to mesic
Drainage: moderately well to well

TOPOGRAPHY

Elevation: 0 - 150 m
Slope: 0 - 15%
Aspect: all
Landscape position: receiving, lower
slope to valley floor

ECOLOGY

- rich herb layer with very open understory
- some coniferous regeneration, but inhibited by low light
- forest capability medium to high
- high moisture availability; moderate nutrient availability
- following severe disturbance to forest floor

010-91

Columbia lily - green false hellebore

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Subalpine mountain hemlock - Pacific silver fir zone

Successional stage: mature edaphic climax

Stand appearance: herbaceous subalpine meadow

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (0)				
Tall shrub layer (0)				
Low shrub layer (0)				
Herb layer (95)	Columbia lily western bracken alpine blue grass	30 50 50	green false hellebore lupines peavines	10 5 8
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
alpine blue grass Columbia lily	mountain hemlock white-flowered rhododendron

TERRAIN AND SOILS

Terrain: colluvial blanket
 Soil Texture: medium
 Soil Association comp: CW3
 Moisture regime: hygric
 Drainage: moderately well

TOPOGRAPHY

Elevation: 1000 m
 Slope: 30%
 Aspect: southwest
 Landscape position: middle to upper slope

ECOLOGY

- excessive moisture and formation of an organic top on the soil prevents tree establishment

010-92	Western hemlock - western sword fern - fireweed
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal Section: Quadra, Nootka
 Zone/Subzone: Coastal western hemlock zone: western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: young seral
 Stand appearance: open coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (0)				
Tall shrub layer (5)	western hemlock	5	coast Douglas-fir (planted) Sitka spruce (planted)	<5 <5
Low shrub layer (10)	red huckleberry western hemlock	5 5		
Herb layer (70)	fireweed western sword fern wall-lettuce	15-60 15 10	foamflowers common lady fern deer fern	10 5 5
Moss, lichen and liverwort layer (20)	rhytidiadelphus loreus moss	5	polytrichum moss	5

CHARACTER SPECIES

Present	Absent
deer fern fireweed western hemlock western sword fern	salmonberry Canadian bunchberry Pacific silver fir red alder devil's-club salal

TERRAIN AND SOILS

Terrain: fluvial; moraine
 Soil Texture: coarse
 Soil Association comp: GT1,H01
 Moisture regime: hygric to mesic
 Drainage: well

TOPOGRAPHY

Elevation: 100 - 400 m
 Slope: 0 - 35%
 Aspect: all
 Landscape position: normal to receiving, lower to upper slope

ECOLOGY

- vegetation type dominated by pioneer herbs and surviving understory herbs after logging activity, with western hemlock naturally regenerating

010-93

Coast Douglas-fir - western hemlock - American vanilla leaf

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Successional stage: maturing to overmature seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (70)	coast Douglas-fir western hemlock	70 5	western red cedar	<5
Tall shrub layer (25)	western hemlock	10		
Low shrub layer (10)	red huckleberry western hemlock	5-40 <5		
Herb layer (80)	western sword fern American vanilla leaf western bracken	20 25 5	two-leaved false Solomon's-seal wall-lettuce foamflowers	20 <5 5
Moss, lichen and liverwort layer (30)	eurhynchium moss hylocomium moss	15 25	mnium moss	<5

CHARACTER SPECIES

Present	Absent
western sword fern western hemlock hylocomium moss	salmonberry western thimbleberry devil's-club simple-stemmed twistedstalk deer fern fireweed

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: medium to coarse
Soil Association comp: F3,HM2,KY1
Moisture regime: subhygric to mesic
Drainage: moderately well

TOPOGRAPHY

Elevation: 50 - 400 m
Slope: 0 - 15%
Aspect: all
Landscape position: normal to receiving, valley floor to middle slope

ECOLOGY

- high forestry capability vegetation type
- shrub layer relatively open, with dense herbaceous layer dominated by ferns allows easy access for recreational use

010-94

Hardhack - sedges

VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal

Section: Mahahat

Zone/Subzone: Coastal grand fir - western red cedar zone

Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone

Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature edaphic climax

Stand appearance: wetland marsh to wetland swamp

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (0)				
Tall shrub layer (5)			willows red alder Pacific crab apple	<5 <5 <5
Low shrub layer (100)	hardhack	10-100	sweet gale	varies
Herb layer (50)	sedges	50	American skunk cabbage	<5
Moss, lichen and liverwort layer (<5)			peat moss	<5

CHARACTER SPECIES

Present	Absent
hardhack sedges American skunk cabbage	Coast Douglas-fir tufted hair grass rye grasses blue grasses Yorkshire fog Pacific trailing blackberry rushes

TERRAIN AND SOILS

Terrain: organic
Soil Texture: mesic
Soil Association comp: AE1,AR1,AR7,AZ7

Moisture regime: hydric
Drainage: imperfect to very poor

TOPOGRAPHY

Elevation: 0 - 400 m
Slope: 0%
Aspect: level
Landscape position: valley floor in collecting depressions

ECOLOGY

- typical of sites with high, mineral-rich water table; with reduced available oxygen, nutrients to plants
- sweet gale will dominate over hardhack if water is well oxygenated
- often associated with shallow open water wetlands or lake margins

010-95	Sitka spruce - salal - vetches
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VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature edaphic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (variable)	Sitka spruce	varies		
Tall shrub layer (variable)	salal	10	Sitka spruce	varies
Low shrub layer (85)	salal salmonberry	85 5	Nootka rose	<5
Herb layer (<5)	vetches	<5	western bracken	<5
Moss, lichen and liverwort layer (0)				

CHARACTER SPECIES

Present	Absent
Sitka spruce vetches salal (tall shrub)	red alder coastal American red elder palmate colt's-foot field mint eurhynchium moss

TERRAIN AND SOILS

Terrain: marine
Soil Texture: sandy
Soil Association comp: NT7,KL4,UC1

Moisture regime: mesic
Drainage: well to rapid

TOPOGRAPHY

Elevation: 0 - 40 m
Slope: 0 - 10%
Aspect: all
Landscape position: normal to receiving, lower slope

ECOLOGY

- dense, windblown type, often with spruce stunted and deformed
- invades recent marine sand deposits, aiding in stabilization of substrate
- often contains species associated with open beach communities (010-44; 010-72)

010-96	Red alder - salmonberry - western sword fern
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VEGETATION CHARACTERISTICS

Region: Inner Coastal; Outer Coastal **Section:** Quadra; Nootka
Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone and western hemlock subzone
 Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: young seral
Stand appearance: dense deciduous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (60-90)	red alder	60-90	bigleaf maple	5-10
Tall shrub layer (60)	salmonberry	10-80	coastal American red elder coast Douglas-fir	5 <5
Low shrub layer (40)	salmonberry	10-50	western thimbleberry western hemlock western red cedar	<5 <5 <5
Herb layer (30-70)	western sword fern common lady fern two-leaved false Solomon's-seal	5-50 5 10	deer fern Siberian spring beauty wall-lettuce	<5 <5 <5
Moss, lichen and liverwort layer (15)	leucopis moss mniun moss	5 5	eurhynchium moss rhytidadelphus loreus moss	<5 <5

CHARACTER SPECIES

Present	Absent
red alder salmonberry western sword fern two-leaved false Solomon's-seal	devil's-club American skunk cabbage

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: medium to coarse
Soil Association comp: B1,HA1,HM1,HP2,OK1,SK1,V1
Moisture regime: subhygric to hygric
Drainage: imperfect to well

TOPOGRAPHY

Elevation: 0 - 300 m
Slope: 0 - 2%
Aspect: all
Landscape position: receiving, lower slope to valley floor

ECOLOGY

- dense shrub layer of nuisance species, with rich, diverse herbaceous understory
- varying species of coniferous regeneration often present
- sites subject to occasional flooding
- forest capability very high, but growth inhibited by alder and dense shrubs
- nutrient and moisture availability good to excellent
- type usually occurs after disturbance, whether natural or man-induced that removes organic top from soil, exposing mineral soil

010-97

SR740230

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: mature edaphic climax

Stand appearance: open mixed forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (40)	coast Douglas-fir bigleaf maple	30 10		
Tall shrub layer (15)			bigleaf maple coast Douglas-fir western flowering dogwood	5 5 5
Low shrub layer (45)	red huckleberry dull Oregon-grape common snowberry	10 10 20	baldhip rose western flowering dogwood	5 5
Herb layer (40)	western sword fern broad-leaved starflower	20 10	Pacific trailing blackberry	7
Moss, lichen and liverwort layer (30)	rhytidiadelphus mosses	20	hylocomium moss	7

CHARACTER SPECIES

Present	Absent
coast Douglas-fir bigleaf maple western flowering dogwood	western hemlock salal

TERRAIN AND SOILS

Terrain: colluvial blanket
Soil Texture: medium
Soil Association comp: CT1
Moisture regime: xeric
Drainage: rapid

TOPOGRAPHY

Elevation: 240 m
Slope: 70%
Aspect: 225°
Landscape position: shedding;
lower slope

ECOLOGY

- southerly facing slope drier than average, with edaphic climax forest of Douglas-fir
- bigleaf maple will slowly be removed by overshadowing coniferous species
- tree productivity will be low due to frequent moisture stress during growing season

010-98

Pacific silver fir - devil's club - foamflowers - moss

VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone and yellow cedar subzone

Successional stage: mature climatic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	Pacific silver fir western hemlock	10-60 20	western red cedar	10
Tall shrub layer (variable)	Pacific silver fir	10	western hemlock	5
Low shrub layer (50)	devil's-club salmonberry oval-leaved blueberry	10 5 10	red huckleberry Pacific silver fir western hemlock	5 10 5
Herb layer (35)	western sword fern deer fern foamflowers	5 15 10	common lady fern American vanilla leaf	<5 <5
Moss, lichen and liverwort layer (20)	rhytidiadelphus loreus moss	varies	mnium mosses	5

CHARACTER SPECIES

Present	Absent
foamflowers devil's-club western sword fern salmonberry mnium mosses common lady fern	coast Douglas-fir sedges salal yellow cedar red alder

TERRAIN AND SOILS

Terrain: moraine; colluvium
Soil Texture: fine to coarse
Soil Association comp: CII, GL1, RI1, RR1, SR2, SS5

Moisture regime: hygric
Drainage: imperfect to moderately well

TOPOGRAPHY

Elevation: 0 - 850 m
Slope: 0 - 40%
Aspect: all
Landscape position: receiving seepage, lower to middle slope

ECOLOGY

- sites enriched by additional nutrient input from upslope seepage
- productive forest, with canopy open enough to allow light to reach understory, which with added water input is quite diverse, with a higher-than-average cover for this forest zone
- moisture never limiting to vegetative growth

010-99	SR73168E
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VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat

Zone/Subzone: Coastal grand fir - western red cedar zone

Successional stage: mature edaphic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	% crown cover	Associates	% crown cover
Tree layer (90)	western hemlock	90		
Tall shrub layer (10)			western hemlock	10
Low shrub layer (0)				
Herb layer (4)			northern twinflower bracken	1 1
Moss, lichen and liverwort layer (25)	eurhynchium moss	20		

CHARACTER SPECIES

Present	Absent
western hemlock eurhynchium moss	coast Douglas-fir grand fir western red cedar salal dull Oregon-grape

TERRAIN AND SOILS

Terrain: fluvial
Soil Texture: fine
Soil Association comp: CP1
Moisture regime: subhygric
Drainage: moderately well

TOPOGRAPHY

Elevation: 30 m
Slope: 30%
Aspect: 23°
Landscape position: receiving,
lower slope

ECOLOGY

- unusual dense hemlock forest in a cool moist gully
- very little light penetration through to understory, so herbs and shrubs almost absent

010-100 SR750095

VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Hootka

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone

Successional stage: mature edaphic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	coast Douglas-fir western hemlock	65 20	Sitka spruce bigleaf maple	2 2
Tall shrub layer (5)			western hemlock red huckleberry	2 2
Low shrub layer (0)				
Herb layer (85)	western sword fern	85		
Moss, lichen and liverwort layer (25)	eurhynchium moss rhytidiadelphus loreus moss	15 10		

CHARACTER SPECIES

Present	Absent
coast Douglas-fir western sword fern bigleaf maple	Pacific silver fir deer fern salal oval-leaved blueberry

TERRAIN AND SOILS

Terrain: colluvial blanket
Soil Texture: coarse
Soil Association comp: CR2
Moisture regime: submesic
Drainage: well

TOPOGRAPHY

Elevation: 30 m
Slope: 30%
Aspect: 140°
Landscape position: normal,
lower slope

ECOLOGY

- southerly facing, rubbly site that is edaphically dry
- dense canopy allows little light penetration, so ferns and mosses predominate
- common site for the Outer Coast Region along immediate rocky shoreline and lower river valley sides

Successional stage: young seral to mature climatic climax
Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	western hemlock	60		
Tall shrub layer (40)	salmonberry red huckleberry	15 10	western hemlock	10
Low shrub layer (60)	red huckleberry salal salmonberry	10 5-60 15	rusty Pacific menziesia	5
Herb layer (40)	deer fern western sword fern	20 10	common lady fern foamflower	5 <5
Moss, lichen and liverwort layer (5)				

CHARACTER SPECIES

Present	Absent
western hemlock rusty Pacific menziesia deer fern	peat mosses American skunk-cabbage

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: medium to coarse
Soil Association comp: CR1,HP2,KO1,WT1,V4

Moisture regime: hygric
Drainage: imperfect to moderately well

TOPOGRAPHY

Elevation: 0 - 100 m
Slope: 0 - 5%
Aspect: all
Landscape position: receiving to
normal, lower slope to valley floor

ECOLOGY

- type dominated by very dense cover of salmonberry
- tree cover may not be fully developed because of past disturbances and inhibiting affect of dense shrub layer

010-102

Western hemlock - Sitka spruce - salmonberry - western sword fern

VEGETATION CHARACTERISTICS

Region: Outer Coastal

Section: Nootka; Hecate

Zone/Subzone: Coastal western hemlock - Pacific silver fir zone: western red cedar subzone
Coastal western hemlock - western red cedar zone: shore pine

Successional stage: mature edaphic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	western hemlock Sitka spruce	50 20	red alder Pacific silver fir	10 10
Tall shrub layer (20)	western hemlock	5	salmonberry Sitka spruce	varies <5
Low shrub layer (variable)	salmonberry	10-80	red huckleberry	<5
Herb layer (30)	western sword fern foamflowers common lady fern	10 5 8	deer fern	<5
Moss, lichen and liverwort layer (40)	eurhynchium moss rhytidiadelphus loreus moss hylocomium moss	20 5 10	mnium mosses	<5

CHARACTER SPECIES

Present	Absent
false bugbane Sitka spruce salmonberry foamflowers red alder	peat mosses

TERRAIN AND SOILS

Terrain: fluvial; marine
Soil Texture: medium to coarse
Soil Association comp: CU1,CU6,HH1,K03,SG7Moisture regime: subhygric
Drainage: imperfect to well

TOPOGRAPHY

Elevation: 0 - 300 m
Slope: 0 - 4%
Aspect: all
Landscape position: receiving to normal, valley floor

ECOLOGY

- rich, diverse sites, with high forestry capability
- usually occurs on floodplain sites, so possibility of occasional flooding may exist
- nuisance species, such as salmonberry and, occasionally devil's-club, make passage difficult

010-103 | SR740082

VEGETATION CHARACTERISTICS

Region: Inner Coastal **Section:** Quadra
Zone/Subzone: Coastal western hemlock zone: western hemlock subzone

Successional stage: young edaphic climax
Stand appearance: open mixed or coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (45)	Sitka spruce	40	red alder	10
Tall shrub layer (25)	red alder Pacific crab apple western hemlock	7 5 5	western red cedar	5
Low shrub layer (40)	salal salmonberry western hemlock	25 7 7	western red cedar Nootka rose	5 5
Herb layer (60)	Pacific trailing blackberry western sword fern	10 15	melic grasses brome grasses	20 10
Moss, lichen and liverwort layer (60)	rhytidiadelphus mosses hylocomium moss	40 15		

CHARACTER SPECIES

Present	Absent
Sitka spruce salal western hemlock Pacific crab apple	coast Douglas-fir Pacific silver fir bigleaf maple red huckleberry

TERRAIN AND SOILS

Terrain: fluvial
Soil Texture: coarse
Soil Association comp: SY2
Moisture regime: subhygric
Drainage: moderately well

TOPOGRAPHY

Elevation: 2 m
Slope: 30%
Aspect: 90°
Landscape position: receiving,
lower slope

ECOLOGY

- site on inland channel, logged about 60 years ago
- heavy growth of epiphytes on spruce
- marine influence may control initial tree establishment by inputting salts on young trees, favouring Sitka spruce

010-104

SR73129E

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Quadra

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: mature edaphic climax

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	Crown cover	Associates	Crown cover
Tree layer (80)	grand fir	65	coast Douglas-fir bigleaf maple	10 5
Tall shrub layer (25)	grand fir	10	western hemlock bigleaf maple red huckleberry	2 5 5
Low shrub layer (25)	dull Oregon-grape	20	red huckleberry	5
Herb layer (60)	western sword fern	30	broad-leaved starflower sweet-scented bedstraw	10 10
Moss, lichen and liverwort layer (35)	eurhynchium moss	30		

CHARACTER SPECIES

Present	Absent
grand fir coast Douglas-fir western hemlock dull Oregon-grape American vanilla leaf	western red cedar red alder salal Nootka rose twinflor

TERRAIN AND SOILS

Terrain: fluvio-glacial
Soil Texture: coarse
Soil Association comp: HAI
Moisture regime: mesic
Drainage: well

TOPOGRAPHY

Elevation: 75 m
Slope: 5%
Aspect: 90°
Landscape position: normal,
lower slope

ECOLOGY

- unusual site, with dense grand fir canopy in absence of apparent seepage
- probably resembles expected climatic climax further south on the east coast
- deciduous tree component small and not reproducing

010-105

SR750037

VEGETATION CHARACTERISTICS

Region: Inner Coastal

Section: Malahat

Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: maturing seral

Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (60)	coast Douglas-fir	60		
Tall shrub layer (7)			coast Douglas-fir	7
Low shrub layer (15)	coast Douglas-fir	5	red huckleberry western hemlock dull Oregon-grape	3 3 3
Herb layer (85)	trailplant wall-lettuce twinfleur	35 20 10	pipsissewa	10
Moss, lichen and liverwort layer (40)	eurhynchium moss	35	hylocomium moss	5

CHARACTER SPECIES

Present	Absent
coast Douglas-fir red huckleberry large-leaved rattlesnake orchid trailplant	oceanspray western sword fern fescues

TERRAIN AND SOILS

Terrain: fluvial veneer over moraine
Soil Texture: coarse
Soil Association comp: D2
Moisture regime: mesic
Drainage: well

TOPOGRAPHY

Elevation: 200 m
Slope: 0°
Aspect: all
Landscape position: normal,
valley floor

ECOLOGY

- drier-than-average site for understory plants, though underlying moraine promotes good tree growth
- lack of low shrub layer unusual without fern domination; though low light penetration allows a dense moss layer

010-106	SR740191
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VEGETATION CHARACTERISTICS

Region: Inner Coastal Section: Malahat
 Zone/Subzone: Coastal western hemlock zone: coast Douglas-fir subzone

Successional stage: maturing seral
 Stand appearance: dense coniferous forest

SPECIES COMPOSITION

Layer (% crown cover)	Dominants	%crown cover	Associates	%crown cover
Tree layer (80)	coast Douglas-fir	80		
Tall shrub layer (0)				
Low shrub layer (8)			red huckleberry coast Douglas-fir	3 5
Herb layer (40)	trailplant wall-lettuce harebells	15 10 10	northern twinflower bracken	7 5
Moss, lichen and liverwort layer (50)	eurhynchium moss hylocomium moss	30 15		

CHARACTER SPECIES

Present	Absent
coast Douglas-fir harebells trailplant wall-lettuce	western red cedar salal dull Oregon-grape

TERRAIN AND SOILS

Terrain: fluvio-glacial terrace
 Soil Texture: coarse
 Soil Association comp: Q3
 Moisture regime: subhygric
 Drainage: well

TOPOGRAPHY

Elevation: 185 m
 Slope: 5%
 Aspect: 180°
 Landscape position: receiving;
 lower slope

ECOLOGY

- very dense regenerating forest after logging
- sparse understory due to low light penetration

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APPENDIX A
DESCRIPTION OF CATEGORIES USED IN VEGETATION TYPE TABLES

The following is a description of the terminology used in the vegetation type descriptions in Section 1.2. The tables present descriptions of the typical vegetation for each type and the range of environmental factors under which the type occurs.

- Region:** A Forest Region is an area over which the patterns of Forest Zones are a reflection of the regional climate. Forest Regions for the study area are described in Volume One and include the Outer Coastal Region and the Inner Coastal Region. These Regions are presented at a map scale of 1:100 000 in Volume Three.
- Section:** A Section or Forest Section is an area, within a Forest Region, defined by a specific pattern of Forest Zones and/or subzones reflecting a specific regional variation in the climate. Forest Sections for the study area are described in Volume One. Sections were not mapped.
- Zone:** A Zone or Forest Zone is an area of the landscape in which, on sites of similar soil and topographic conditions, the dominant (actual or potential) vegetation of the climax stands is identical. Forest Zones for the Study Area are described in Volume One and are mapped at a scale of 1:100 000 in Volume Three.
- Subzone:** A Subzone or Forest Subzone is an area within a Forest Zone defined on the basis of climatic related successional trends of the dominant vegetation on representative sites or climate related differences in growth form of the dominant vegetation. Forest Subzones are described in Volume One and are mapped at a scale of 1:100 000 in Volume Three.

Successional Stage: The following categories are recognized. More comprehensive definitions may be found in Walmsley et al. (1980).

- a) pioneer seral - disturbance has been severe enough to inhibit usual successional stages and a distinct vegetation is 'pioneering' on the site.
- b) young seral - usual successional stage, generally younger than sixty years old.
- c) maturing seral - usual successional stage generally between sixty and one hundred and forty years. Both climax and seral species are usually present.
- d) overmature seral - usual successional stage, generally older than one hundred and forty years. Climax species may dominate or the overmature seral species are distinctly decadent as evident from dead tops and disease agents present.
- e) climatic climax vegetation - the climax community found on typical well-drained soils. Vegetation generally reflects the climate of an area. Young climatic climax vegetation is generally less than sixty years old; mature climatic climax vegetation has acquired the structure and composition of mature stands. This vegetation is generally more than sixty years old.
- f) edaphic climax vegetation - the climax vegetation which more directly reflects site climax plant communities to differ from the climatic climax. Young edaphic climax acquired the structure and composition of mature communities. The vegetation is generally more than sixty years old.

Stand Appearance: Stand appearance is the structure and appearance of the vegetation regardless of the species of which it is composed. It includes:

Forested Areas

**coniferous
forested
dense**

Tree crowns cover more than 50% of the area and less than 1/10 of the crown coverage is provided by broadleaved trees.

coniferous forested open	Tree crowns cover between 25% and 50% of the area and less than 1/10 of the crown coverage is provided by broadleaved trees.
coniferous forested parkland	Tree crowns cover between 1% and 25% of the area and less than 1/10 of the crown coverage is provided by broadleaved trees.
broadleaved forested dense	Tree crowns cover more than 50% of the area and less than 1/10 of the crown coverage is provided by coniferous trees.
broadleaved forested open	Tree crowns cover between 25% and 50% of the area and less than 1/10 of the crown coverage is provided by coniferous trees.
broadleaved forested parkland	Tree crowns cover between 1% and 25% of the area and less than 1/10 of the crown coverage is provided by coniferous trees.
mixed forested dense	Tree crowns cover more than 50% of the area and coniferous and broadleaved trees each provide more than 1/10 of the total crown coverage.
mixed forested open	Tree crowns cover between 25% and 50% of the area and coniferous and broadleaved trees each provide more than 1/10 of the total coverage.
mixed forested parkland	Tree crowns cover between 1% and 25% of the area and coniferous and broadleaved trees each provide more than 1/10 of the total crown coverage.

Non-forested Areas

- alpine tundra** Treeless area dominated by cold-resistant vegetation consisting of low-matted shrubs, herbs and lichens adapted to complete their reproductive cycle in short growing seasons.
- krummholz** Area in which, in response to severe and fluctuating climatic conditions, subalpine tree species occur in stunted and layered forms as scattered individuals, in clumps (tree islands), or in discontinuous coverage with the nontreed areas dominated by herbs, lichens, and/or shrubs.
- meadow** Treeless area dominated by herbaceous plants in response to improved moisture conditions (in relation to the general climate) from snowmelt, seepage and/or high water tables for at least part of the year.
- nonvegetated** Areas mostly devoid of vegetation other than that involved in the initial breakdown of rock and rock particles (certain lichens and mosses); areas may be bedrock, talus, glaciers, gravel pits, and other recently disturbed surfaces.
- pioneer undifferentiated** Treeless area dominated by shrubs or herbs prior to establishment of seral tree species. Vegetation is not specified.
- pioneer herb** Treeless area dominated by herbs prior to establishment of seral tree species. This pioneer community may represent an early stage in succession to forest communities or it may represent herb communities on recent surficial deposits.

pioneer shrub	Treeless area dominated by shrubs. This pioneer community may represent an early stage in succession to forest communities or shrub communities on recent surficial deposits (including those subject to periodic disturbance such as avalanches and flood-plains).
recently logged	Areas mostly devoid of vegetation because of recent logging (and possible subsequent ash burning and scarification); usually remnants of previous vegetation remain.
wetland undifferentiated	Marshes, swamps, fens, bogs, or inundated areas with emergent wetland vegetation, for which vegetation is not specified.
wetland bog	Areas with organic substrate covered by ombrotrophic (mineral-poor, rain-fed) mosses (usually sphagnums), with or without trees.
wetland marsh	Areas with mineral substrate (often with a thin surface of muck) inundated for significant portions of the year, supporting herbaceous vegetation.
wetland swamp	Areas with mineral substrate (often with a thin surface of muck) inundated for significant portions of the year, supporting woody vegetation which is dominant over the herbaceous vegetation.

SPECIES COMPOSITION

The percentage values given are typical values for the type. Dominants are those species that dominate each layer. They are usually characteristic of the type. Associates are those species that are not always present in the type

but are frequently found. Botanical names are given for each species in Appendix B.1.

- Tree layer:** The structural layer of a vegetation stand that includes tree species generally taller than 10 m (layers 1, 2, and 3 on constancy tables).
- Tall shrub layer:** The structural layer of a vegetation stand that includes all shrubs and tree regeneration between 2 m and 10 m in height (layer 6 on constancy tables).
- Low shrub layer:** The structural layer of a vegetation stand that includes all shrubs (except dwarf shrubs) and tree regeneration under 2 m in height (layer 7 on constancy tables).
- Herb layer:** The structural layer in a vegetation stand composed of all herbaceous plants and dwarf shrubs growing on the dominant substrate (layer 8 on constancy tables).
- Moss, lichen and liverwort layer:** The structural layer in a vegetation stand that contains all mosses, lichens and liverworts that grow on the dominant substrate (layer 9 on constancy tables).
- Character Species:** The Character Species are the species used to differentiate a type from similar types with which it may be confused. Character Species listed as Present are lacking from similar types while those listed as Absent are lacking from the type but are present in similar types.

TERRAIN AND SOILS

Terrain: Information given in this category includes: position in the terrain, depth of material and the kinds of parent material on which the type is found. Parent material is the unaltered, or essentially unaltered, mineral or organic material in which a soil develops through the operation of soil-forming processes (see E.L.U.C. Secretariat, 1976).

Soil Texture: The relative proportions of the various soil particle size components (clay, silt and sand) with soil materials. The following soil texture classes are recognized (Canada Department of Agriculture, 1974: 168-169):

coarse texture: sand

loamy sand

sandy loam

medium texture: loam

silt loam

silt

silty clay loam

clay loam

fine texture: sandy clay

silty clay

clay

heavy clay

Soil Association (and components): A soil association is a group of soils that occurs associated in the landscape based on similarities in climatic or physiographic factors, soil parent materials and vegetation zonation. Components are differentiated on the basis of relief, drainage,

texture or other characteristics. Those association components listed are described and mapped in Jungen (1980) and/or Chatterton and Senyk (1980). When a 'wide range' of soils is associated with a type, the list of soil association components may be incomplete; a more complete list can be extracted from Table 1 of this volume.

**Moisture
Regime:**

The moisture regime of an area is a class of a relative scale of moisture available for plant growth that applies within the climatic regime of a forest subzone. From driest to wettest the classes are (see Walmsley et al. 1980):

xeric (very dry)
subxeric
submesic
mesic (average)
subhygric
hygric
subhydric
hydric (very wet)

Drainage:

The following classes are used (Canada Department of Agriculture 1974: 220-221):

rapidly drained
well drained
moderately well drained
imperfectly drained
poorly drained
very poorly drained

Topography:

Elevation: in meters
Slope: in percent
Aspect: in degrees

**Landscape
Position:**

This refers to which segment of the surface of the landscape a type is found (slope position macro) in conjunction with a moisture modifier (slope position moisture). Categories include (Vegetation Functional Subcommittee 1976):

slope position macro: apex
 upper slope
 middle slope
 lower slope
 valley floor
 plain

slope position moisture: shedding
 normal
 receiving
 collecting
 seepage

Ecology:

This refers to those characteristics of the environment which allows the particular vegetation type to occur. It includes consideration of: moisture and nutrient availability and cycling, length of growing season, temperature, precipitation, soil, aspect, plant competition and other significant factors.

APPENDIX B

VASCULAR PLANT SPECIES LIST

The following vascular plant species listing¹ provides common and botanical names used in Volume 1, in the vegetation type description in Chapter 1, Volume 2, and in the constancy tables in Appendix C, Volume 2. The first list links botanical names to alphabetically ordered common names (B.1); the second list links the alphabetically ordered computer codes used in the constancy tables to the common names (B.2). Taxonomy of vascular plants follows Taylor and MacBryde (1977).

Problems in making consistent identifications to the specific level in some taxonomically difficult genera, or when lower significant ecological differences exist between closely related species, have resulted in the grouping of some species by genus. This was done for the purpose of maximizing allowable information in the classification program (limit is 200 specific entries) and for elimination of some error in future field use of the classification.

Species in the bryophyte plant layer (D) are listed separately (B.3). Taxonomy of lichens follows Hale and Culberson (1970); taxonomy of liverworts follows Stotler and Crandall-Stotler (1977); and taxonomy of mosses follows Crum et al. (1973).

¹For common names of mosses, the botanical genus name (and sometimes the species name) is used as an adjective to "moss" (e.g. Hylocomium splendens moss = Hylocomium splendens).

B.1 VASCULAR PLANTS LISTINGS

<u>Common Name</u>	<u>Botanical Name</u>
Alaskan blueberry	<i>Vaccinium alaskaense</i>
Alaska onion grass	<i>Melica subulata</i>
American skunk cabbage	<i>Lysichiton americanum</i>
American vanilla leaf	<i>Achlys triphylla</i>
apargidium	<i>Microseris borealis</i>
baldhip rose	<i>Rosa gymnocarpa</i>
bent grasses	<i>Agrostis</i> spp.
bigleaf maple	<i>Acer macrophyllum</i>
big-leaved sandwort	<i>Moehringia macrophylla</i>
black blueberry	<i>Vaccinium membranaceum</i>
black crowberry	<i>Empetrum nigrum</i>
black swamp gooseberry	<i>Ribes lacustre</i>
blue-bead clintonia	<i>Clintonia uniflora</i>
blue grasses	<i>Poa</i> spp.
blue-leaved wild strawberry	<i>Fragaria virginiana</i>
bog club-moss	<i>Lycopodium inundatum</i>
bristly manzanita	<i>Arctostaphylos columbiana</i>
broad-leaved starflower	<i>Trientalis latifolia</i>
brome grasses	<i>Bromus</i> spp.
buttercups	<i>Ranunculus</i> spp.
Canadian bunchberry	<i>Cornus canadensis</i>
Cascade blueberry	<i>Vaccinium deliciosum</i>
cascara	<i>Rhamnus purshianus</i>
clovers	<i>Trifolium</i> spp.
club-mosses	<i>Lycopodium</i> spp.
coastal American red elder	<i>Sambucus racemosa</i>
coast Douglas-fir	<i>Pseudotsuga menziesii</i>
Columbia lily	<i>Lilium columbianum</i>

<u>Common Name</u>	<u>Botanical Name</u>
common cleavers	<i>Galium aparine</i>
common Labrador tea	<i>Ledum groenlandicum</i>
common lady fern	<i>Athyrium filix-femina</i>
common cat's-ear	<i>Hypochoeris radicata</i>
common pearly everlasting	<i>Anaphalis margaritacea</i>
common pink pyrola	<i>Pyrola asarifolia</i>
common snowberry	<i>Symphoricarpos albus</i>
common western pipsissewa	<i>Chimaphilia umbellata</i>
common yarrow	<i>Achillea millefolium</i>
Cooley's hedge nettle	<i>Stachys cooleyae</i>
copperbrush	<i>Cladothamnus pyroliflorus</i>
coralroots	<i>Corallorhiza</i> spp.
cucumberroot twistedstalk	<i>Streptopus amplexifolius</i>
deer-cabbage	<i>Fauria crista-golli</i>
deer fern	<i>Blechnum spicant</i>
devil's-club	<i>Oplopanax horridus</i>
dull Oregon-grape	<i>Mahonia nervosa</i>
early hair grass	<i>Aira praecox</i>
evergreen huckleberry	<i>Vaccinium ovatum</i>
fairybells	<i>Disporum</i> spp.
false bugbane	<i>Trautvetteria caroliniensis</i>
false dandelions	<i>Agoseris</i> spp.
false Solomon's-seal	<i>Smilacina racemosa</i>
fescues	<i>Festuca</i> spp.
few-flowered one-sided wintergreen	<i>Orthilia secunda</i>
field mint	<i>Mentha arvensis</i>
fireweed	<i>Epilobium angustifolium</i>
five-leaved creeping raspberry	<i>Rubus pedatus</i>
foamflowers	<i>Tiarella</i> spp.
Garry oak	<i>Quercus garryana</i>

<u>Common Name</u>	<u>Botanical Name</u>
grand fir	<i>Abies grandis</i>
green false hellebore	<i>Veratrum viride</i>
groundcones	<i>Boschniakia</i> spp.
hardhack	<i>Spiraea douglasii</i>
harebells	<i>Campanula</i> spp.
hawkweeds	<i>Hieraceum</i> spp.
horsetails	<i>Equisetum</i> spp.
Idaho fescue	<i>Festuca idahoensis</i>
kinnikinnick	<i>Arctostaphylos uva-ursi</i>
large-leaved rattlesnake orchid	<i>Goodyera oblongifolia</i>
licorice fern	<i>Polypodium glycyrrhiza</i>
lodgepole pine	<i>Pinus contorta</i>
lovages	<i>Ligusticum</i> spp.
lupines	<i>Lupinus</i> spp.
Menzies' pipsissewa	<i>Chimaphila menziesii</i>
Merten's cassiope	<i>Cassiope mertensiana</i>
mountain hemlock	<i>Tsuga mertensiana</i>
mountain holly fern	<i>Polystichum lonchitis</i>
mountain sweetcicely	<i>Osmorhiza chilensis</i>
Nootka rose	<i>Rosa nutkana</i>
northern maidenhair fern	<i>Adiantum pedatum</i>
northern starflower	<i>Trientalis europea</i>
northern twinflower	<i>Linnaea borealis</i>
oak fern	<i>Gymnocarpium dryopteris</i>
oceanspray	<i>Holodiscus discolor</i>
one-flowered wintergreen	<i>Moneses uniflora</i>
Oregon boxwood	<i>Paxistima myrsinites</i>
Oregon-wintergreen	<i>Gaultheria ovatifolia</i>

<u>Common Name</u>	<u>Botanical Name</u>
oval-leaved blueberry	<i>Vaccinium ovalifolium</i>
Pacific bleedingheart	<i>Dicentra formosa</i>
Pacific crab apple	<i>Malus fusca</i>
Pacific madrone	<i>Arbutus menziesii</i>
Pacific saskatoon	<i>Amelanchier alnifolia</i>
Pacific silver fir	<i>Abies amabilis</i>
Pacific trailing blackberry	<i>Rubus ursinus</i>
palmate colt's-foot	<i>Petasites palmatus</i>
parsley fern	<i>Cryptogramma crispa</i>
peavines	<i>Lathyrus</i> spp.
penstemons	<i>Penstemon</i> spp.
red alder	<i>Alnus rubra</i>
red huckleberry	<i>Vaccinium parvifolium</i>
red mountain-heather	<i>Phyllodoce empetrifolia</i>
Rocky Mountain maple	<i>Acer glabrum</i>
running club-moss	<i>Lycopodium clavatum</i>
rushes	<i>Juncus</i> spp.
rusty Pacific menziesia	<i>Menziesia ferruginea</i>
salal	<i>Gaultheria shallon</i>
salmonberry	<i>Rubus spectabilis</i>
Scotch broom	<i>Cytisus scoparius</i>
sedges	<i>Carex</i> spp.
selaginellas	<i>Selaginella</i> spp.
shore pine	<i>Pinus contorta</i>
Siberian spring beauty	<i>Claytonia sibirica</i>
simple-stemmed twistedstalk	<i>Streptopus roseus</i>
Sitka burnet	<i>Sanguisorba canadensis</i>
Sitka mountain-ash	<i>Sorbus sitchensis</i>
Sitka spruce	<i>Picea sitchensis</i>
small bedstraw	<i>Galium trifidum</i>

<u>Common Name</u>	<u>Botanical Name</u>
spiny shield fern	<i>Dryopteris austriaca</i>
spleenwort-leaved goldthread	<i>Coptis aspleniifolia</i>
sticky false asphodel	<i>Tofieldia glutinosa</i>
strawberries	<i>Fragaria</i> spp.
sundews	<i>Drosera</i> spp.
sweet gale	<i>Myrica gale</i>
sweet-scented bedstraw	<i>Galium triflorum</i>
tall Oregon-grape	<i>Mahonia aquifolium</i>
thistles	<i>Cirsium</i> spp.
trailplant	<i>Adenocaulon bicolor</i>
tufted hair grass	<i>Deschampsia cespitosa</i>
twayblades	<i>Listera</i> spp.
twinberry honeysuckle	<i>Lonicera involucrata</i>
two-leaved false Solomon's-seal	<i>Maianthemum dilatatum</i>
vetches	<i>Vicia</i> spp.
violets	<i>Viola</i> spp.
wall-lettuce	<i>Mycelis muralis</i>
western bracken	<i>Pteridium aquilinum</i>
western fescue	<i>Festuca occidentalis</i>
western flowering dogwood	<i>Cornus nuttallii</i>
western hemlock	<i>Tsuga heterophylla</i>
western red cedar	<i>Thuja plicata</i>
western swamp kalmia	<i>Kalmia microphylla</i>
western sword fern	<i>Polystichum munitum</i>
western thimbleberry	<i>Rubus parviflorus</i>
western trumpet honeysuckle	<i>Lonicera ciliosa</i>
western white pine	<i>Pinus monticola</i>
western white trillium	<i>Trillium ovatum</i>
western yew	<i>Taxus brevifolia</i>
white-flowered rhododendron	<i>Rhododendron albiflorum</i>

<u>Common Name</u>	<u>Botanical Name</u>
white-veined pyrola	<i>Pyrola picta</i>
wild rye grasses	<i>Elymus</i> spp.
willows	<i>Salix</i> spp.
wood-rushes	<i>Luzula</i> spp.
yellow cedar	<i>Chamaecyparis nootkatensis</i>
Yorkshire fog	<i>Holcus lanatus</i>

B.2 COMPUTER CODES FOR VASCULAR PLANTS

<u>Computer Code</u>	<u>Common Name</u>
ABIE AMA	Pacific silver fir
ABIE GRA	grand fir
ACER GLA	Rocky Mountain maple
ACER MAC	bigleaf maple
ACHI MIL	common yarrow
ACHL TRI	American vanilla leaf
ADEN BIC	trailplant
ADIA PED	northern maidenhair fern
AGOS ERI	false dandelion
AGRO STI	bent grasses
AIRA PRA	early hair grass
ALNU RUB	red alder
AMEL ALN	Pacific saskatoon
ANAP MAR	common pearly everlasting
ARBU MEN	Pacific madrone
ARCT COL	bristly manzanita
ARCT UVA	kinnikinnick
ATHY FIL	common lady fern
PLEC SPI	deer fern

<u>Computer Code</u>	<u>Common Name</u>
BOSC HNI	groundcone
BROM US	brome grass
CAMP ANU	harebells
CARE X	sedges
CASS MER	Merten's cassiope
CHAM NOO	yellow cedar
CHIM MEN	Menzies' pipsissewa
CHIM UMB	common western pipsissewa
CIRS IUM	thistle
CLAD PYR	copperbrush
CLAY SIB	Siberian spring beauty
CLIN UNI	blue-bead clintonia
COPT ASP	spleenwort-leaved gold-thread
CORA LLO	coralroots
CORN CAN	Canadian bunchberry
CORN NUT	western flowering dogwood
CRYP CRI	parsley fern
CYTI SCO	Scotch broom
DESC CES	tufted hair grass
DICE FOR	Pacific bleedingheart
DISP ORU	fairybells
DROS ERA	sundews
DRYO AUS	spiny shield fern
ELYM US	wild rye grass
EMPE NIG	black crowberry
EPIL ANG	fireweed
EQUI SET	horsetails
FAUR CRI	deer-cabbage
FEST IDA	Idaho fescue
FEST OCC	western fescue
FEST UCA	fescues

<u>Computer Code</u>	<u>Common Name</u>
FRAG ARI	strawberries
FRAG VIR	blue-leaved wild strawberry
GALI APA	common cleavers
GALI TRI	small bedstraw
GALI TRF	sweet-scented bedstraw
GAUL OVA	Oregon-wintergreen
GAUL SHA	sala1
GOOD OBL	large-leaved rattlesnake orchid
GYMN DRY	oak fern
HIER ACI	hawkweeds
HOLC LAN	Yorkshire fog
HOLO DIS	oceanspray
HYPO RAD	common cat's-ear
JUNC US	rushes
KALM MIC	western swamp kalmia
LATH YRU	peavines
LEDU GRO	common Labrador tea
LIGU STI	lovages
LILI COL	Columbia lily
CINN BOR	northern twinflower
LIST ERA	twayblade
LONI CIL	western trumpet honeysuckle
LONI INV	twinberry honeysuckle
LUPI NUS	lupines
LUZU LA	wood-rushes
LYCO CLA	running club-moss
LYCO INU	bog club-moss
LYCO POD	club-mosses
LYSI AMER	American skunk-cabbage
MAHO AQU	tall Oregon-grape
MAHO NERV	dull Oregon-grape

Computer CodeCommon Name

MAIA DIL	two-leaved false Solomon's-seal
MALU FUS	Pacific crab apple
MELI SUB	Alaska onion grass
MENT ARV	field mint
MENZ FER	rusty Pacific menziesia
MICR BOR	apargidium
MOEH MAC	big-leaved sandwort
MONE UNI	one-flowered wintergreen
MONT SIB	Siberian spring beauty
MYCE MUR	wall-lettuce
MYRI GAL	sweet gale
OPLO HOR	devil's-club
ORTH SEC	few-flowered one-sided wintergreen
OSMO CHI	mountain sweetcicely
PAXI MYR	Oregon boxwood
PENS TEM	penstemons
PETA PAL	palmate colt's-foot
PHYL EMP	red mountain-heather
PICE SIT	Sitka spruce
PINU CON	lodgepole pine/shore pine
PINU MON	western white pine
POA	blue grasses
POLY GLY	licorice fern
POLY LOC	mountain holly fern
POLY MUN	western sword fern
PSEU MEN	coast Douglas-fir
PTER AQU	western bracken
PYRO ASA	common pink pyrola
PYRO PIC	white-veined pyrola
QUER GAR	Garry oak
RANU NCU	buttercups

<u>Computer Code</u>	<u>Common Name</u>
RHAM PUR	cascara
RHOD ALB	white-flowered rhododendron
RIBE LAC	black swamp gooseberry
ROSA GYM	baldhip rose
ROSA NUT	Nootka rose
RUBU PAR	western thimbleberry
RUBU PED	five-leaved creeping raspberry
RUBU SPE	salmonberry
RUBU URS	Pacific trailing blackberry
SALI X	willows
SAMB RAC	coastal American red elder
SANG CAN	Sitka burnet
SELA GIN	selaginellas
SMIL RAC	false Solomon's-seal
SORB SIT	Sitka mountain-ash
SPIR DOU	hardhack
STAC COO	Cooley's hedge-nettle
STRE AMP	cucumberroot twistedstalk
STRE ROS	simple-stemmed twistedstalk
SYMP ALB	common snowberry
TAXU BRE	western yew
THUJ PLI	western red cedar
TIAR ELL	foamflowers
TOFI GLU	sticky false asphodel
TRAU CAR	false bugbane
TRIE EUR	northern starflower
TRIE LAT	broad-leaved starflower
TRIF OLI	clovers
TRIL OVA	western white trillium
TSUG HET	western hemlock
TSUG MER	mountain hemlock

<u>Computer Code</u>	<u>Common Name</u>
VACC ALA	Alaskan blueberry
VACC DEL	Cascade blueberry
VACC MEM	black blueberry
VACC OVA	oval-leaved blueberry
VACC OVT	evergreen huckleberry
VACC PAR	red huckleberry
VERA VIT	green false hellebore
VICI A	vetches
VIOL A	violets

B.3 MOSESSES, LICHENS AND LIVERWORTS LISTINGS

<u>Computer Code</u>	<u>Common Name</u>	<u>Botanical Name</u>
BRAC ASP	brachythecium moss	<i>Brachythecium asperrium</i>
DICR ANU	dicranum mosses	<i>Dicranum</i> spp.
EURH YNC	eurhynchium mosses	<i>Eurhynchium</i> spp.
GRIM MIA	grimmia mosses	<i>Grimmia</i> spp.
HOMA LOT	homalothecium mosses	<i>Homalothecium</i> spp.
HOOK ERI	hookeria moss	<i>Hookeria</i> spp.
HYLO SPL	hylocomium moss	<i>Hylocomium splendens</i>
ISOT HEC	isothecium mosses	<i>Isothecium</i> spp.
LEUC MEN	leucolepis moss	<i>Leucolepis menziesii</i>
MNIU M	mnium mosses	<i>Mnium</i> spp.
NECK ERA	neckera mosses	<i>Neckera</i> spp.
PELT IGE	peltigera lichens	<i>Peltigera</i> spp.
PLAG IOT	plagiothecium mosses	<i>Plagiothecium</i> spp.
PLEU SCH	pleurozium moss	<i>Pleurozium schreberi</i>
POGO NAT	pogonatum mosses	<i>Pogonatum</i> spp.
POLY TRI	polytrichum mosses	<i>Polytrichum</i> spp.

<u>Computer Code</u>	<u>Common Name</u>	<u>Botanical Name</u>
RHAC OMI	rhacomitrium mosses	<i>Rhacomitrium</i> spp.
RHIZ GLA	rhizomnium moss	<i>Rhizomnium glabrescens</i>
RHYT LOR	rhytidiadelphus loreus moss	<i>Rhytidiadelphus loreus</i>
RHYT ROB	rhytidiopsis moss	<i>Rhytidiopsis robusta</i>
RHYT SQU	rhytidiadelphus squarrosus moss	<i>Rhytidiadelphus squarrosus</i>
RHYT TRI	rhytidiadelphus triquetrus moss	<i>Rhytidiadelphus triquetrus</i>
SCAP BOL	scapania liverwort	<i>Scapania bolanderi</i>
SPHA GNU	peat mosses	<i>Sphagnum</i> spp.



APPENDIX C CONSTANCY TABLES

The following constancy tables summarize the percent occurrence of each species in each vegetation type. Vegetation types are numbered across the top of the tables; see Figure 1 for the vegetation type names. Order of types follows Figure 1. Immediately beneath the type number are the number of releves (sample plots) in the data set for each vegetation type. Plant names are listed on the left side of the table, organized by plant layers (see Appendix A). The common names for layers 1 through 8 are given in Appendix B.2; those for layer 9 are given in Appendix B.3. The numbers assigned to each species name are internally derived by the classification program and can be ignored. Species absences are designated by blanks; species occurring in single-releve vegetation types have constancies listed as 100 percent. The last column on the final page of these tables lists overall species constancy for the total set of plots.

[illegible]